TECHNOLOGY DEPT.

the OIL AND GAS JOURNAL

PUBLIC LIBRARY
JUN 3 1950
DETROIT

BJ NEW Type B Power Slip

TAKE A LOOK at this new BJ Type B Power Slip—see for yourself what *new* engineering, *new* design advancements, *new* field testing and proving can do for economical power slip operation on your rig.

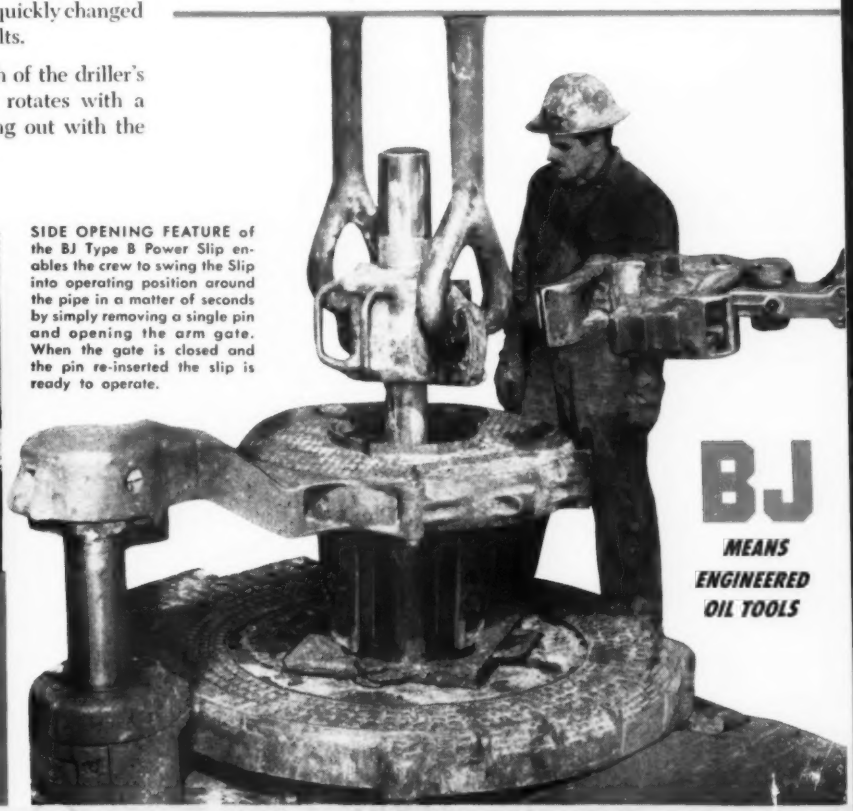
COMPACT! Note the single cylinder for pressure raising and *pressure setting* of slips . . . the offset arm construction for increased work room . . . *unitized* slips which can be quickly changed for different pipe sizes by simply removing two bolts.

FAST! The Type B sets and releases at the touch of the driller's foot, gives pressure-centering of pipe. Slip ring rotates with a free floating action when making up and breaking out with the rotary table.

SAFE! In set position, slip ring body clears rotary table by several inches—an important safety feature. Capacity of the new Type B Power Slip is more than enough for today's deepest wells and heaviest strings.

The new Type B Power Slip handles 2⅞" to 7" drill pipe by simply changing slips. Compact sub-base design permits unitizing the power slip with any rotary table and *installation is made without changing your rig substructures.* Write for new Bulletin giving full details—find out how you can handle your pipe strings easier, faster and safer with the new BJ Power Slip. *Or see your BJ representative—today.*

SIDE OPENING FEATURE of the BJ Type B Power Slip enables the crew to swing the Slip into operating position around the pipe in a matter of seconds by simply removing a single pin and opening the arm gate. When the gate is closed and the pin re-inserted the slip is ready to operate.



Byron Jackson Co.
Since 1872
Main Office & Plant: Los Angeles 54, Calif.
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Stocking Jobbers All Principal Oil Fields

BJ MEANS ENGINEERED OIL TOOLS

XUM

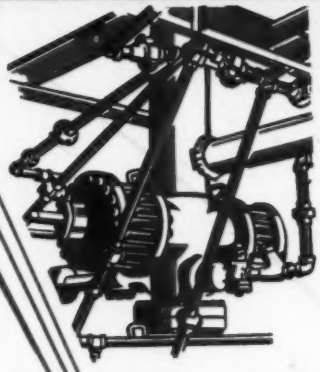
Relieve the Strain with

UNIBOLT FLEXI-BALL JOINTS

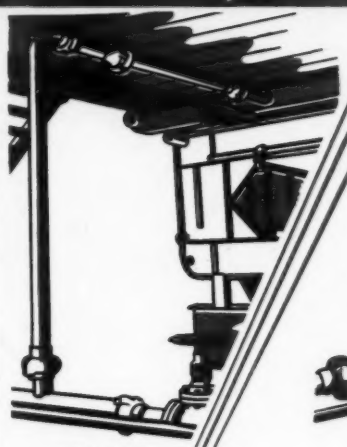
ROTARY HOSE—
STANDPIPE END

ROTARY HOSE—
SWIVEL END

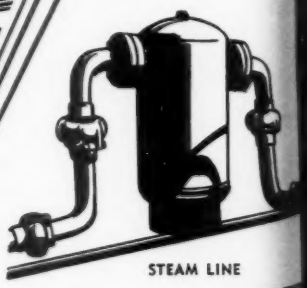
MUD LINES



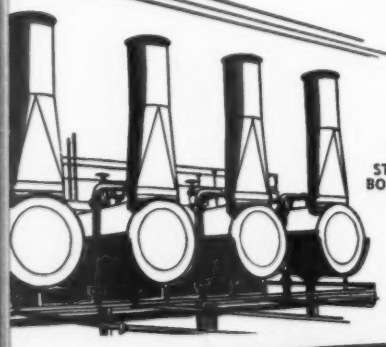
PRESSURE OPERATED
BLOWOUT PREVENTER
MANIFOLD



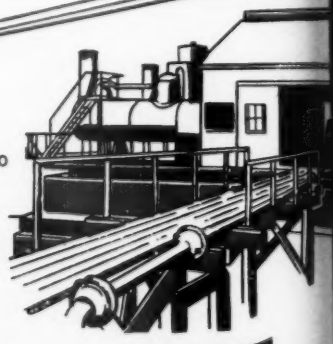
STEAM LINE
SUBJECTED TO
VIBRATION



STEAM LINE



STEAM LINE
BOILER DROPS



STEAM LINE—
BOILER BARGE TO
DRILL BARGE

The Flexi-Ball Joint, which provides for misalignment up to 38 degrees, depending on the size of the joint, is designed to relieve piping of stress caused by expansion, vibration, or misalignment. It is a "natural" for flexible manifolds.

The proven UNIBOLT coupling principle is employed to join the component parts of this fitting. As a result, trouble due to galling and freezing of threads is entirely eliminated by the Flexi-Ball design. It is assembled by the simple process of tightening one bolt with an end wrench. Even after extended periods of service, the joint can be quickly dismantled by releasing the bolt.

This fitting may be used safely in any service, since it is made in steel only. Its sizes range from 1½" to 6" and test pressures to 6000 lbs., depending on size; 500 lbs. steam working pressure.

THORNHILL-CRAVER CO.

HOUSTON, UNIBOLT **TEXAS**

XUM

Chemical section of one of the five Du Pont District Laboratories

BETTER GASOLINE... *more economically*

Your Du Pont District Laboratory can help you with the complete line of Du Pont Gasoline Additives

A 48% reduction in antioxidant treating costs through the use of Metal Deactivator . . . a similar case where a saving of 35% was effected...a recommendation for a change in antioxidants which resulted in substantially lowered costs... these three cases are typical examples of the services offered by Du Pont Field Laboratories to refiners in their area.

The laboratories provide a comprehensive service on problems involving gasoline quality. These include routine inspections, oxidation stability and TEL response. As a result of these studies, they can frequently recommend one or more additives, from the complete line of Du Pont Gasoline Additives, which will help you produce a better gasoline. There are also numerous case histories where Du Pont Technical Representatives have helped solve troublesome or costly refinery problems through the use of the proper additives at the right place in the refining operation.

To avail yourself of these and other technical services, call or write your nearest Petroleum Chemicals District Office.

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Better Things For Better Living
...Through Chemistry

Petroleum Chemicals

Make Du Pont the Source for All of Your Gasoline Additives ... Tetraethyl Lead Compounds (Motor Mix—Aviation Mix)—Antioxidants—Metal Deactivator—Dyes

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XUM

No trouble at all!

With Fairbanks-Morse 8-Cover Side-Pot Duplex Power Pumps, it's no trouble at all to get an outstanding record for long, economical service.

These pumps are built to last—*and do!* They are ruggedly designed and built to the conservative standards of oil field pump practice. No sacrifice in design, materials and manufacture has been made to achieve lighter weight. For, after all, light weight in oil field power pumps is not important . . . strength and liberal safety factors are! Here's why Fairbanks-Morse Power Pumps have set dependable performance records wherever they have been used. When you want the best in power pumps . . . in service . . . dependability . . . freedom from excessive maintenance and repairs, the name is Fairbanks-Morse.

Fairbanks-Morse Power Pumps are available in fully bronze-fitted, oil-fitted or slush-fitted styles. For all the facts, see your supply store or write Fairbanks, Morse & Co., Chicago 5, Ill.

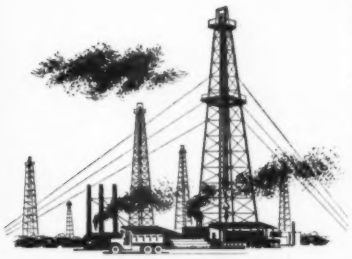
FAIRBANKS-MORSE,

a name worth remembering

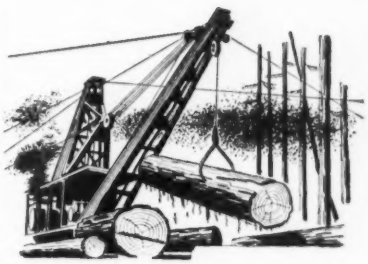
OIL FIELD EQUIPMENT • DIESEL LOCOMOTIVES AND ENGINES • ELECTRICAL MACHINERY • PUMPS • SCALES • HOME WATER SERVICE AND HEATING EQUIPMENT • RAIL CARS • FARM MACHINERY

XUM

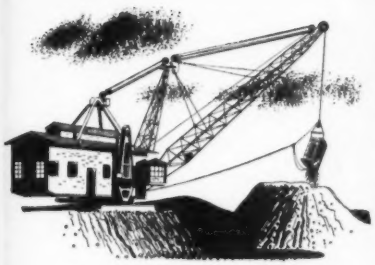
For better service use the right rope



For rotary drilling,
*PRE*formed, Internally Lubricated wire line designed to wind smoothly on drums and to withstand abrasion from running through blocks.

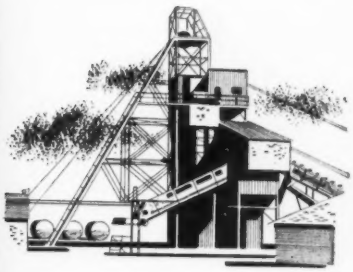


For logging operations,
tough flexible ropes for tractor arch lines, chokers, skidders and loading.

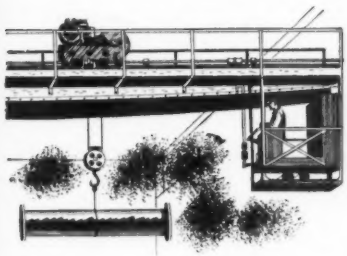


For shovels and draglines,
ropes for different sizes and types of equipment designed to give best service for your particular needs.

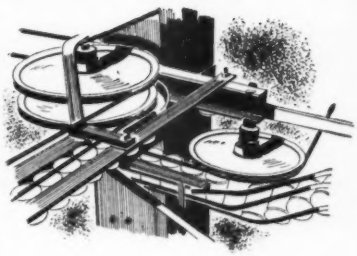
The right rope for each job is available from



For shaft mining,
shallow or deep, internally lubricated ropes to meet all load and speed requirements.



For cranes and hoists,
small or large, *PRE*formed Internally Lubricated wire ropes of the correct size and flexibility for each use.



For can conveyors,
there are bright carbon steel, stainless steel and monel metal wire ropes to meet various service conditions.

A thousand and one
MACWHYTE
Internally Lubricated
WIRE ROPES

It pays to choose the right rope for your equipment

Besides the ropes listed above, Macwhyte makes many more such as cable tool drilling lines, elevator cables, incline or haulage ropes, scraper ropes, aircraft control cable assemblies, ropes for ship rigging and guying work, as well as hundreds of sizes and types of single-part, round-braided or flat-braided slings for material handling.

To get the best service, keep down maintenance costs, and *save wire rope dollars*, call your Macwhyte distributor or write direct to Macwhyte Company for recommendations. Catalog on request.

MACWHYTE WIRE ROPE

MACWHYTE COMPANY 2916 Fourteenth Avenue, Kenosha, Wisconsin Manufacturers of Internally Lubricated PREformed Wire Rope, Braided Wire Rope Slings, Aircraft Cables and Assemblies, Monel Metal and Stainless Steel Wire Rope. Our distributors and mill depots carry stocks for immediate delivery. Mill Depots: New York • Pittsburgh • Chicago Minneapolis • Fort Worth • Portland • Seattle • San Francisco • Los Angeles

987

XUM

BARRETT* PROTECTIVE PRODUCTS
COVER EVERY PIPE-COATING NEED

1 Pipeline Enamel
2 Millwrap Enamel
3 A.A. Enamel
4 Asbestos Felt
5 Materials for Special Uses

BARRETT* MATERIALS FOR SPECIAL USES

BARRETT* CA-50 HEAVY-DUTY COLD APPLICATION COATING. Protects metal or concrete exposed to severely corrosive acid or alkali vapors in industrial plants . . . dam and flood control works . . . sewage disposal plants . . . wherever extra-heavy, durable protection is required.

BARRETT* ETERNIUM* PAINT. This high-quality coal-tar paint has been used successfully for many years to protect metal and woodwork in mines, chemical plants, or wherever corrosive conditions are severe.

BARRETT* 34 YB COLD APPLICATION COATING. Withstands corrosive conditions of waterfront and marine conditions, such as piers, ships, floating drydocks, and service vessels for off-shore oil and gas wells.

BARRETT* SERVICE CEMENT. The standard for many years for protecting field joints of welded pipe. This coal-tar "putty" is applied cold. No priming or torching of surface is required. Used with Barrett Pipeline Fabric.

BARRETT* PIPELINE FABRIC. This strong, durable, coal-tar saturated fabric is widely used as a reinforcing membrane or tape. Barrett Service Cement is used with it to protect field joints of pre-coated pipes.

BARRETT* INDUSTRIAL COATING. Provides corrosion control under the most punishing conditions of Industrial Plant corrosive exposures. For maximum resistance, this heavy-bodied liquid coal-tar paint is reinforced with inert minerals. Extreme cold does not affect it, and it also withstands dry heat of approximately 400° F.

Memo: **FOR CORROSION ENGINEERS**

Attention to product quality, and knowledge of the service requirements of every product, explains why Barrett coal-tar coatings for special uses are so satisfactory and dependable.

The listing above covers only six of the many *Barrett Materials for Special Use*. The Barrett organization will be most happy to consult with you—without cost or obligation—on any special protective problems you may have. A satisfactory solution will almost certainly be found among Barrett's many, and moderately priced, specialized protective coatings.

Barrett*

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

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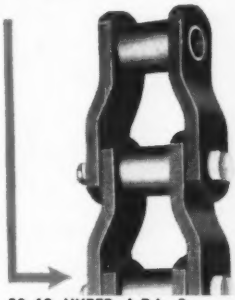
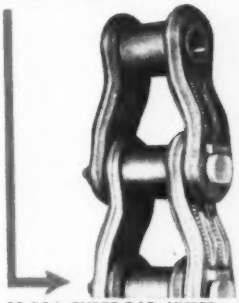
L-B CHAINS *can take it!*

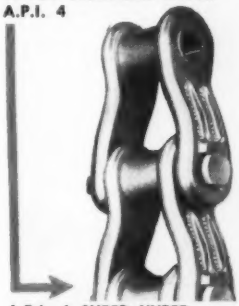
Shallow or Deep . . . Easy or tough



SS-40 HYPER A.P.I. 3



SS-124 THREE-BAR HYPER A.P.I. 4



A.P.I. 4 SUPER HYPER PRECISION CHAIN

SS-3125 DOUBLE HYPER

These Link-Belt oil drilling chains have been engineered and precision-built to "take it", and keep going. From the SS-40 Hyper for your rotary table to SS-3125 Hyper Triple for your hoists and engine drives, you'll find L-B Chain for your requirements.

Well balanced design, proper selection of materials and accuracy in manufacture make these chains the strongest, most dependable for the severe service encountered in oil well drilling.

Link-Belt Chains are carried in stock by your local supply store.

LINK-BELT COMPANY

Indianapolis 6, Dallas 1, Houston 1, Kansas City 8, Mo., Los Angeles 33, New York 7, Toronto 8. Offices in Principal Cities.

11,882

LINK-BELT

CHAINS AND SPROCKETS

A Type for Every OIL INDUSTRY SERVICE

HERE ARE THE FACTS ON KONESHOT PENETRATION

This chart shows the average penetration, in inches, of all three sizes of KONESHOT guns, through one, two and three strings of casing, into aged, neat cement. Shown also, is the average hole size in the first string.

	HOLE SIZE .19"	HOLE SIZE .19"	HOLE SIZE .19"
3¼" GUN 10-GRAM CHARGE	5½"-17#-N80 — 5/16" STEEL PLUS 5 7/16" CEMENT	4½"-16.6# DRILL PIPE 8¾"-28#-GR. C. — 5/8" STEEL PLUS 4¾" CEMENT	5½"-14#-GR. A. 7"-26#-GR. C. 9"-40# — 1" STEEL PLUS 2½" CEMENT
4" GUN 21-GRAM CHARGE	HOLE SIZE .28" — 5½"-17#-N80 — 5/16" STEEL PLUS 7" CEMENT	HOLE SIZE .28" — 5½"-15.5#-J55 7"-26#-N80 — 5/8" STEEL PLUS 6⅜" CEMENT	HOLE SIZE .28" — 5½"-15.5#-J55 7"-26#-N80 9"-45# — 1⅛" STEEL PLUS 3⅜" CEMENT
5" GUN 28-GRAM 34-A CHARGE	HOLE SIZE .35" — 7"-26#-N80 — 3/8" STEEL PLUS 9¼" CEMENT	HOLE SIZE .35" — 7"-26#-N80 9"-45#-J55 — ¾" STEEL PLUS 7 3/16" CEMENT	HOLE SIZE 35" — 7"-26#-N80 9"-45#-J55 10¾"-47.5#-J55 — 1¼" STEEL PLUS 6" CEMENT

Ask Your LANE WELLS *Man!*

TECHNICAL OILFIELD SERVICES

AK-305

Lane-Wells Company
5610 South Soto Street, Los Angeles 58, Calif.
Please send me your new Perforating Bulletin.

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Company_____
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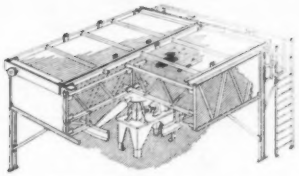
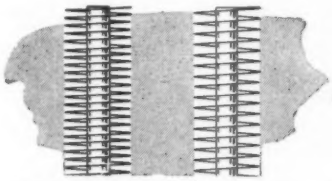
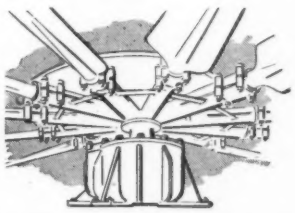
LANE-WELLS CANADIAN CO. IN CANADA • PETRO-TECH SERVICE CO. IN VENEZUELA



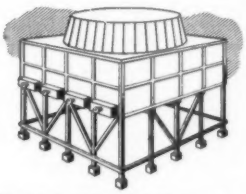
RIGID STRUCTURE . . . truss-sections give rigid but light design — requiring a small, inexpensive foundation. Rigidity assures longer-life coil sections.



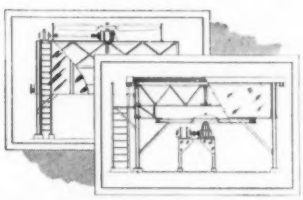
EFFICIENT FINNED TUBES . . . pressure bonded fins on tubes give high level heat transfer not dependent on solder joints. Various fins, tubes and headers available to meet any application.



PROVEN MECHANICAL EQUIPMENT . . . multibladed fans and rugged Geareducers team up to give quiet, smooth and dependable operation . . . regardless of weather or location.

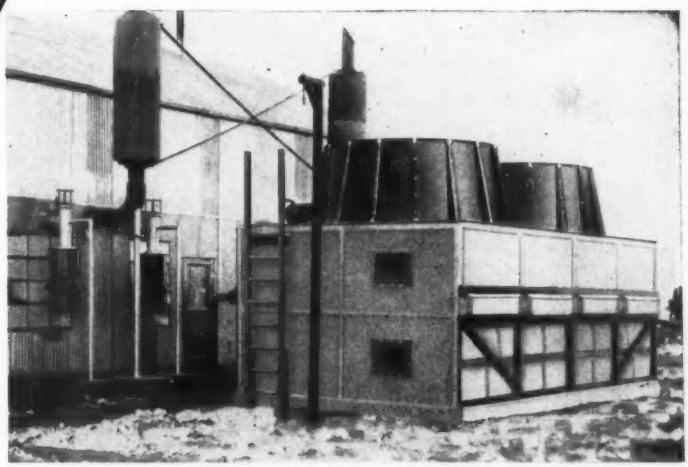


ALTERNATE MATERIALS . . . where corrosion is a problem, asbestos-board casing on a redwood frame requires little maintenance. Redwood, standard in cooling tower design, gives strong, durable and rigid support.



COMPLETE STANDARD LINE . . . induced draft or forced draft — portable or stationary — steel or redwood — various fin and tube materials and arrangements are offered by Marley to meet any application — usual or unusual.

Features like these . . . make MARLEY DriCooler® "JOB-ENGINEERED"



"Job-Engineered" to cool jacket water in temperatures ranging from −40F to 100F, an induced draft, asbestos-covered redwood structure.

No single design in an air-cooled heat exchanger will suit all applications. Cooling jacket water in below-zero temperatures, condensing gasoline on the sea coast or serving a pipeline compressor station in the desert . . . each is an exacting application . . . each requires a different type of unit. And that's why Marley has a complete line of DriCoolers available in all sizes and in a wide range of designs and materials.

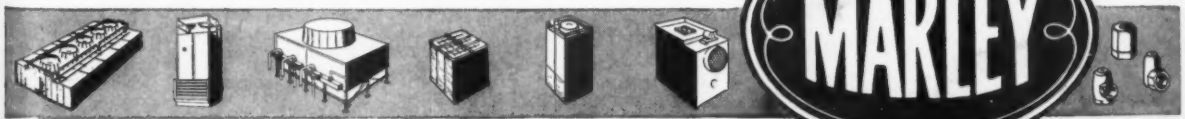
After considering all factors, such as the fluids to be cooled — first cost — horsepower cost — weather conditions — corrosion and many other factors, Marley can make the best and most economical recommendation for your job.

Whether your job requires forced draft or induced draft design, steel or asbestos-board covered redwood structures, special fin or tube materials, you can be sure that your Marley DriCooler is "Job-Engineered" for your specific application.

Let your Marley Application Engineer work with you from the "blueprint" stage on. Write, The Marley Company, Inc., Kansas City 15, Kans.

MARLEY

OG-61

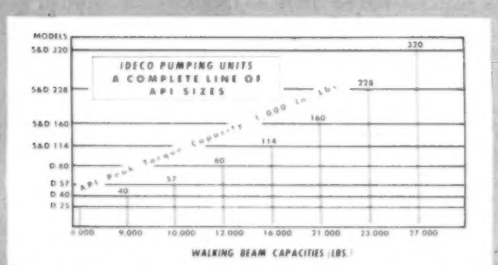


Double-Flow Vairflo DriCooler Natural Draft Counter-Flow Aquatower Spray Nozzles

XUM

Proved Pumping Performance

plus LOWER lifting costs



Such IDECO features as the wheel-type counterbalance, cascade lubricated reducer, and roller-type beam bearings all combine to give you the maximum in service and the minimum in lifting costs. These outstanding features are the result of IDECO's advanced engineering plus 30 years experience in the building of production equipment.

Units are available in both single and double reduction, standard and floor clearing types, and a wide selection of prime mover mountings to fit your particular operating conditions.

IDECO units are made in a complete range of A.P.I. sizes. Before you buy — get all the facts. Write for Bulletin P-49 today.

INTERNATIONAL DERRICK AND EQUIPMENT COMPANY

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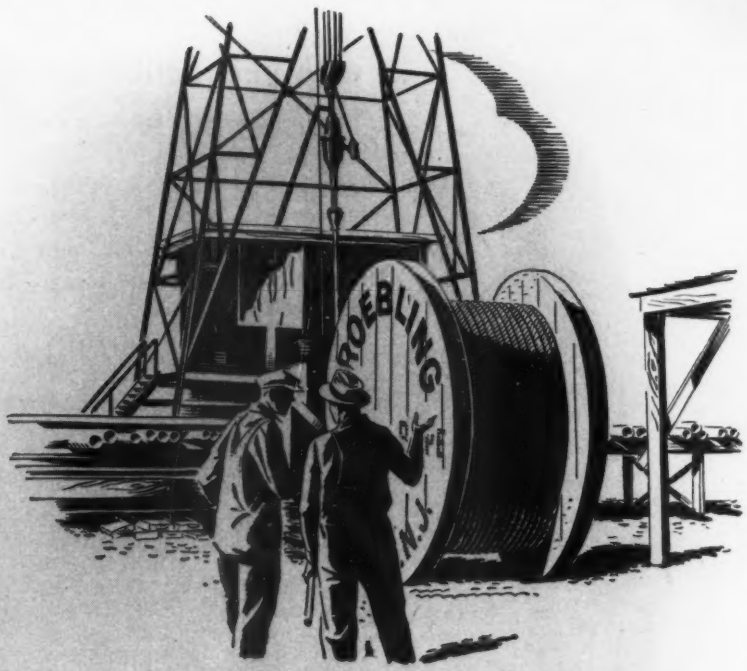
IDECO
ONE OF THE DRESSER INDUSTRIES

As rotary drilling lines, Roebling 6x19 Preformed "Blue Center" Steel Wire Rope with Independent Wire Rope Core has demonstrated extra life on the job and substantial dollar savings.



For rope research and developments that help you save...

Today it's Roebling!

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YEAR BY YEAR, industry makes new and more stringent demands upon wire rope . . . and Roebling leads in developing types that meet these demands with utmost efficiency and economy.

Take Roebling Preformed "Blue Center" Wire Rope with Independent Wire Rope Core!

No finer rope has ever been made, and its basis is "Blue Center" steel—an exclusive Roebling development. Its high resistance to abrasion, shock and fatigue spells long life . . . To this, Roebling *Preforming* brings the further advantages of new handling ease and improved performance . . . And the addition of I.W.R.C. assures top resistance to operating pressures and provides increased rope strength.

Roebling makes a wire rope of the right construction, grade and size for every type and make of rope-rigged equipment. Have your Roebling Field Man recommend the best rope for low-cost performance on each of your installations.

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DISTRIBUTED BY
THE NATIONAL SUPPLY COMPANY
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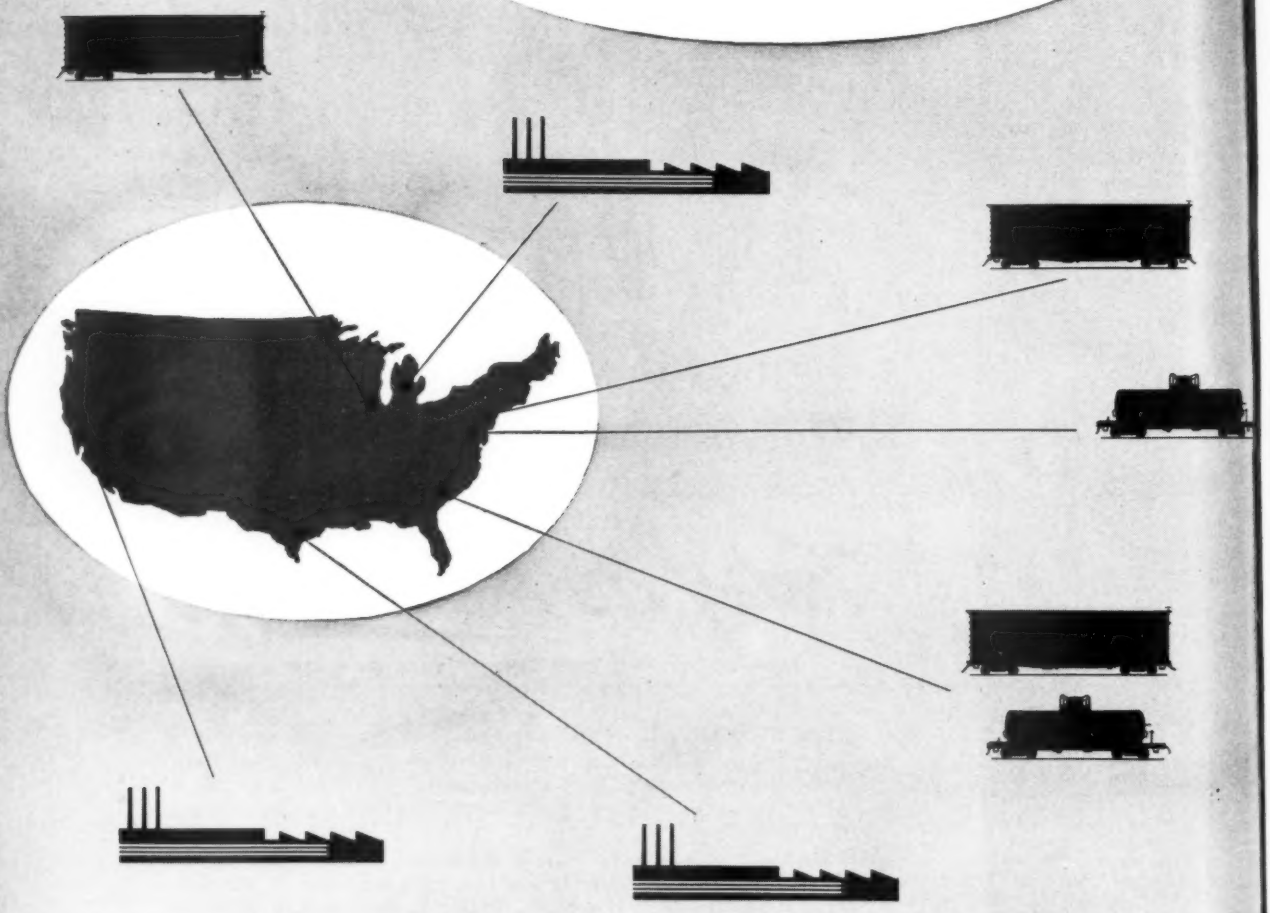

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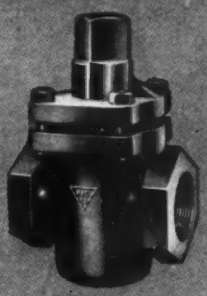

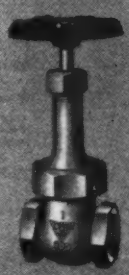

...here's One Reason Why:

Over 60 years ago, a PRATT & CADY Board of Directors passed this resolution:

Resolved:

"That the superintendent
"shall be held responsible
"for the production of goods
"as near perfect in design,
"material and workmanship
"as shall make them merchantable
"and of a character that will serve
"to establish for this company
"a high reputation."

This policy has remained unshaken through two world wars. The "high reputation" has been maintained. More than ever before, the valves offered by R·P&C meet the demand for longer and better service.

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AMERICAN CHAIN & CABLE

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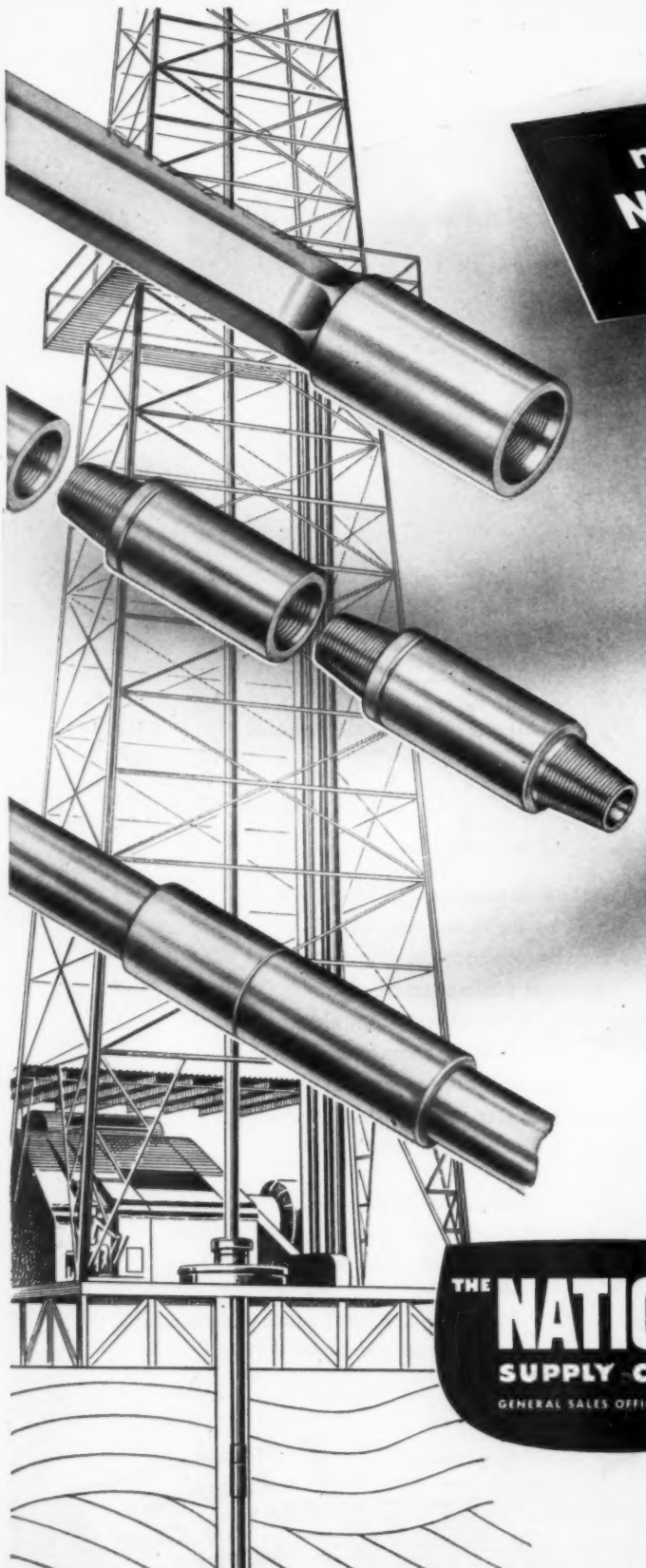

make it a NATIONAL DRILL STRING

The kelly . . . the drill collars . . . the drill pipe . . . all will work better together as a "National" team.

"Ideal" Square and Hex Kellys are forged from special alloys of electric steel and are concentric-bored for perfect balance. "Ideal" Hex Kellys have accurately machined driving surface to assure smoother "feed-off" and better balance. "Ideal" Square Kellys have proper weight balance to assure smoother running at all speeds.

With "Ideal" Replaceable End Drill Collars you can keep the drill string operating at the proper weight . . . no need to run the string light while conventional collars are miles away being rethreaded.

And Spang Double-Seal Shrink Thread Drill Pipe and Tool Joints relieve you of drill-string headaches and costly failures. Double-sealing prevents fluid from leaking into the threads either from the inside or outside of the pipe.

Ask your local National Supply Store for bulletins that describe an all-National drill string.

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NATIONAL OIL FIELD MACHINERY AND EQUIPMENT . . . . SPANG PIPE . . . . SUPERIOR ENGINES

If you use Alloy Steels...

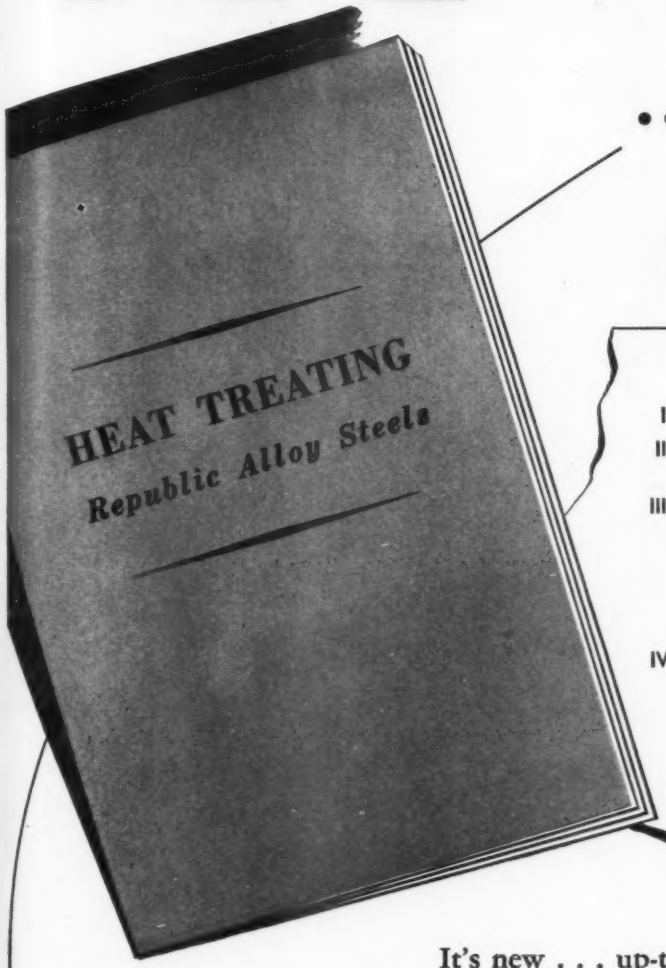

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TABLE OF CONTENTS

I Heat Treatment of Steels

II Transformation of Austenite Shown Graphically (Isothermal Transformation Diagrams)

III Heat Treating Methods

Annealing	Nitriding
Hardening	Cyaniding
Martempering	Flame Hardening
Carburizing	Induction Hardening

IV Mechanical Properties of Alloy Steels

DATA & REFERENCE CHARTS

Critical Points	Carburizing Depths
Ms Calculation	Nitriding Depths
Mechanical Properties	

It's new . . . up-to-the-minute . . . 54 pages of valuable heat treating data that belongs on the desk of every alloy steel user.

Republic—world's largest producer of alloy and stainless steels—offers you this useful booklet without cost or obligation in any way.

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Yours for the asking is this interesting book on wire rope. Among other things it tells how proper care and servicing cuts rope costs. Get your copy at your Jones & Laughlin Supply store or write us at Tulsa. Ask for "WIRE ROPE IS A MACHINE."

Rope that lasts so much longer

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FOR PLUS VALUES, JOB-PROVED AGAIN AND AGAIN

High Score FOR GOOD BEHAVIOR

IF you could check the performance of the thousands of Darling gate valves in oil country use, you'd agree that Darlings make a habit of exceptionally *good* behavior. It's largely a matter of *principle* . . . applied with equal advantage to Darlings from the smallest size to the largest motor-operated pipe line valves. Shown above, for example, are 12- and 16-inch Darling gate valves on water circulating pumps serving a natural gasoline plant.

In the cutaway view you can see the design that cuts out faulty operation and minimizes maintenance—the Darling fully revolving, double disc, parallel seat principle. Just four simple working parts—two interchangeable no-pocket discs and two husky wedges—but they add up to a whale of a difference in service life and over-all operating cost.

We'd like nothing better than to give you *all* the facts on how this principle provides automatic adjustment for valve body distortion and assures positive, easy closing . . . how it eliminates disc-to-seat galling, and distributes wear uniformly.

DARLING VALVES FOR EVERY NEED

Darling parallel seat gate valves (as well as taper seat wedge type) are available in a wide range of sizes and constructions for all kinds of normal and unusual service, and for pressures up to 1500 pounds.

Corrosion resistant types include iron body, plain or rubber lined, with special alloy trim, all bronze, all special alloy, or combinations as required.

ASK FOR BULLETIN

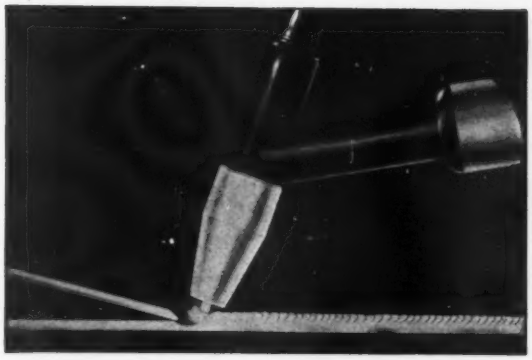
Darling's latest valve bulletin is full of helpful information and describes Darling valves of *all* types for every normal or unusual service.

DARLING VALVE & MANUFACTURING CO.

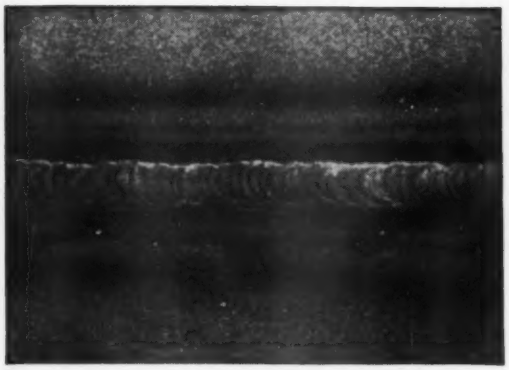
Williamsport 1, Pa.

Weld Sheet Steel with the HELIARC torch

Trade-Mark



and wipe out one complete operation



AS WELDED —*This photograph, unretouched and natural size, shows that* HELIARC *welds in sheet steel are clean and uniform.*

There is no spatter or flux, so you save cleaning costs when you switch to the HELIARC process for welding sheet steel. And you keep the advantages of high speed, and minimum distortion that are characteristic of arc welding. Any manual arc or gas welding operator finds welding with a HELIARC torch easy to master.

Porosity-free welds in killed low-carbon steel up to $\frac{1}{8}$ in. thick can be made with this process. In non-killed grades, welds are as nearly gas free as can be produced by any welding process. Argon-shielding prevents pick-up of atmospheric gases. No argon is dissolved in the weld.

Joints welded with the HELIARC torch will not show under paint, lacquer, or even vitreous enamel finish. It takes only a light grinding to remove the low, smooth ripple and make the bead flush with the surface.

Get more information on this fast, clean, welding process from any LINDE office. Let us show you how it can improve your product and cut your costs. Just fill in the coupon.

The terms "Linde" and "Heliarc" are registered trade-marks of The Linde Air Products Company.

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Offices in Other Principal Cities
In Canada:
DOMINION OXYGEN COMPANY, LIMITED, Toronto

THE LINDE AIR PRODUCTS COMPANY
30 East 42nd Street, New York 17, N. Y.
(or your nearest LINDE office)

Gentlemen: We would like more information on welding sheet steel with the HELIARC torch. We manufacture ..... (Product)
from ..... (Metal) of ..... (Thickness)
We are ☐ (are not ☐) now using inert gas-shielded welding

Name.....Position.....

Company.....

City.....State.....

Rx Prescription for Oil Field Profits

BUCYRUS ERIE

SPUDDERS *on Well Completion Jobs*

On your well completion operations, Bucyrus-Erie spudders can mean new profits for you. Highly mobile, easy to set-up, these modern rigs can move in on a job and get to work within a few hours after rotaries are moved off. With telescoping derrick, folding tubular braces, and power driven derrick hoist, the entire derrick set-up can be handled in less than an hour.

Coupled with this outstanding mobility is the speed with which the spudders perform. The derrick head shock absorber gives each blow real snap for extra penetration to the pay zone. Variable speeds on all drums and catheads (except 24-L) and responsive operating controls mean swabbing and other development operations can be handled quickly, accurately.

Bucyrus-Erie spudders are sold by exclusive distributors in all principal oil territories. See the one nearest to you and ask for further information on all four models — 24-L, 28-L, 36-L, and 48-L.

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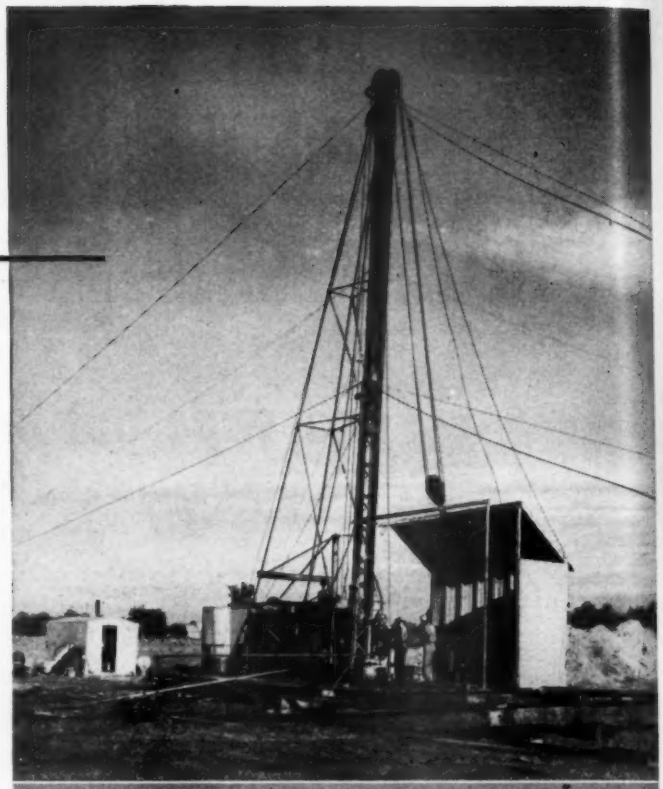

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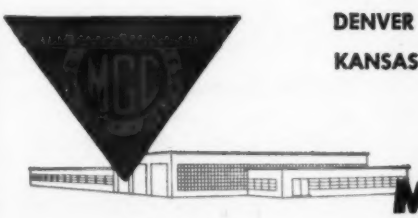

METAL GOODS CORPORATION

They Say—

No Drop in Import

"It is highly disappointing that the major United States oil importing companies have not come forth with firm committments to reduce imports to levels that would permit an immediate recapture of this state's rightful share of the domestic market. We are pleased with the prospect of a sizable increase in Texas production, coming as it is, not the result of decreased imports but rather of increasing consumer demand."

R. L. Foree, president, Texas Independent Producers and Royalty Owners Association, statement in Austin.

Rubber Recommendation

"We must determine how much time will be required to get an inactive rubber-making plant into operation, and the best time to find that out is now, before we are in an emergency.

"We learned, once before, that rubber can be America's Achilles heel. We have a rubber insurance policy that we believe is sound. It is sound in theory—in standby. Action taken now to prove it sound, by test, might well prove to be the most economical program the American people have ever underwritten.

"Right now we need assurance that no development—in the Far East, or arrived at in conferences—will cause America's economic system to sputter or stall for want of rubber.

"The proposed Havana Charter for an international-trade organization, now being considered by Congress, would, in my opinion, encourage formation of the same type of cartels that have in the past restricted crude-rubber production, raising prices and retarding the normal increase of rubber consumption."

John L. Collyer, chairman and president, B. F. Goodrich Co., speaking in New York.

Trend in California

"Looking into the foreseeable future, you can see that the problem in the West is not whether we have a sufficient crude oil supply. Rather, our big problem is in the field of converting more of this crude into the type of products for which there is a substantial market and a good price.

"A number of oil companies on the Pacific Coast already have made plans in this direction, and some have actually begun conversion of refining facilities to turn out a larger percentage of high-use products, such as gasoline and diesel fuel.

"This trend undoubtedly will continue, because California refiners cannot continue to turn out heavy fuel oil for which there is a diminishing market, and they must meet the needs of a growing consumer market for such products as gasoline."

T. S. Petersen, president, Standard Oil Co. of California, speaking in Los Angeles.

Threats for Six

"Let the six importers of foreign oil be admonished to increase their patriotism and exile their greed for profits.

"Let them promptly stop raiding American industries, wrecking American prosperity, endangering American security, and pauperizing American labor, or take notice that the Congress will enact whatever laws may be necessary to protect our vital coal, oil, and railroad industries and all their worthy owners and worthy employes against all the present and future annihilating competition of foreign oil."

Sen. Matthew M. Neely, West Virginia, on the Senate floor.

Trouble Abroad

Sir:

When I first subscribed to the Journal I was working in the States on a temporary assignment and therefore had a limited supply of dollars

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HIGH PRESSURE GAS
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HUMBLE OIL & REF. CO.
HIGH PRESSURE
OIL LINE
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AND ITS EMPLOYEES
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THE TEXAS COMPANY
BOB SLAUGHTER BLOCK
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GULF REFINING COMPANY
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WELL, LEASE, TANK BATTERY, CAUTION, WARNING and thousands of special signs are manufactured by Texlite for the oil industry. These porcelain enamel signs never need replacing or refinishing. Colors are brilliant and do not fade . . guaranteed against all natural elements. The initial cost is the last.
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★ ANY COLOR
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at my disposal. The small account which I left behind when departing to this part of the world is running out fast as I had to draw on it for a variety of articles which are not available here. For this reason I am forced to discontinue my subscription of the Journal, much to my dismay. . . .

I am very grateful to have been able to get my own copy every week for the ridiculously low subscription rate of $3. . . . I hope to be able to subscribe again . . . In the meantime I will continue to read the copy which circulates every week in the company for which I am working.

H. K. Roessingh,
Standard Vacuum Petroleum Maatschappy, S u n g eiGerong, Sumatra, Indonesia.

Reader Roessingh's personal subscription is being continued for a few weeks while he explores the possibility of (1) an international money order and (2) purchase of a subscription by payment of local funds through his company. The Journal circulation department makes every effort to accommodate foreign subscribers since in several countries, as in Indonesia, U. S. dollars are now difficult to obtain.—Editor.

Foreign Policy

"Many United States businessmen are reluctant to venture their capital in foreign investments unless they can operate with the same rights they would enjoy within the United States. We should try to gain these rights for American investors. At the same time we must realize that customs and ways of doing business in other countries are different from our own.

"It is of the greatest importance to repeat that the United States covets no territory and has no intention of interfering with the political structure or political affairs of any other nation. Neither do we covet for ourselves any economic power which could be broadened so as to constitute a control—either in whole or in part—of the government of any independent state. This is our official policy. It is also our rule of practice."

Charles Sawyer, Secretary of Commerce, addressing luncheon of New York Trade Week Committee, New York.

Good Management

"The most successful managements are those which make partners of their employes and, respecting them as individuals, give them every opportunity to develop their initiative, skills, and talents.

"But this freedom should obtain not only as between management and employes. It should motivate management in every phase of its activities.

"When a company engages in monopolistic practices, that company is suffering from bad management. When countries encourage and foster the creation of cartels, those countries are suffering both from bad industrial management and bad government."

J. Howard Pew, director, Sun Oil Co., address at Franklin Institute, Philadelphia.

Stockholders' Defense

"People who think that shareholders of our company who have invested and risked their savings—the savings which make jobs and production possible—are not entitled to be paid for the use of the tools their own work has bought, are taking the position that other people ought to be willing to work for them for nothing. There is no difference between working for nothing—which none of us would dream of doing, unless forced—and working and saving and risking that work-produced money in industry, then being denied a profit on that investment."

Newsvent, British-American Oil Producing Co. and Toronto Pipe Line Co.

One source for ALL YOUR FIELD HOUSING NEEDS

Four rooms and bath with plenty of closet space. An ideal STURDYBILT home for a small family.

A specially designed loading warehouse using standard STURDYBILT 4' x 8' wall sections.

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A special garage designed to accommodate passenger cars and large trucks. Made of Standard STURDYBILT sections.

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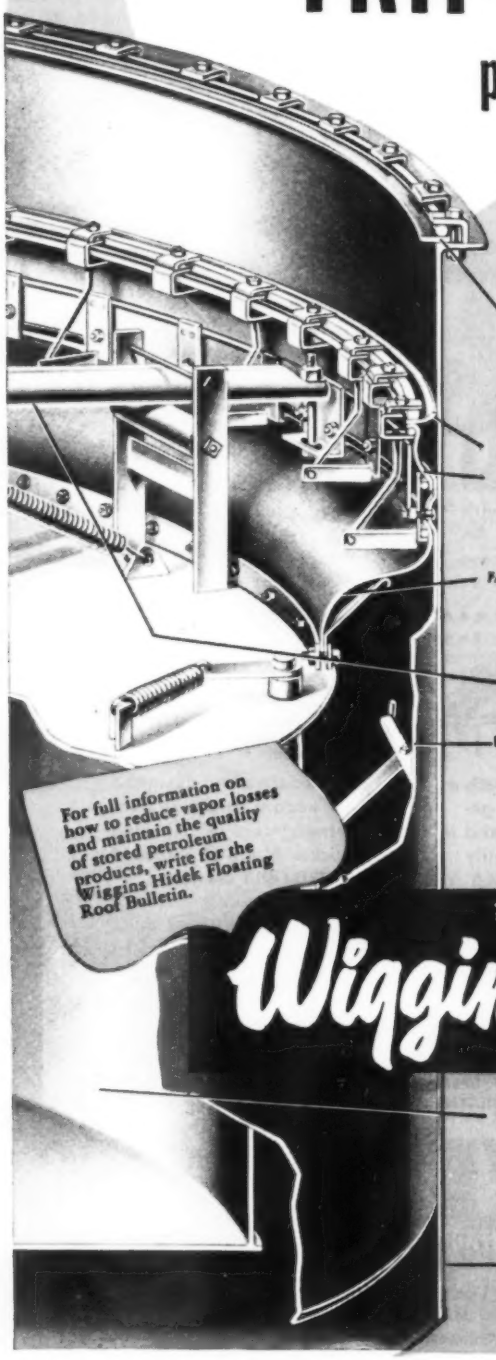
No other floating roof gives you . . .

TRIPLE SEAL

protection



TOP SEAL

Enables use of full tank capacity without increasing shell height. Cuts out 75% of evaporation losses and fire hazard when tank is full.

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Stops wind from sucking valuable vapors out of slot. Saves 50% of the evaporation losses suffered by tanks with a single seal. Standard equipment with Wiggins Floating Roofs for extra savings.

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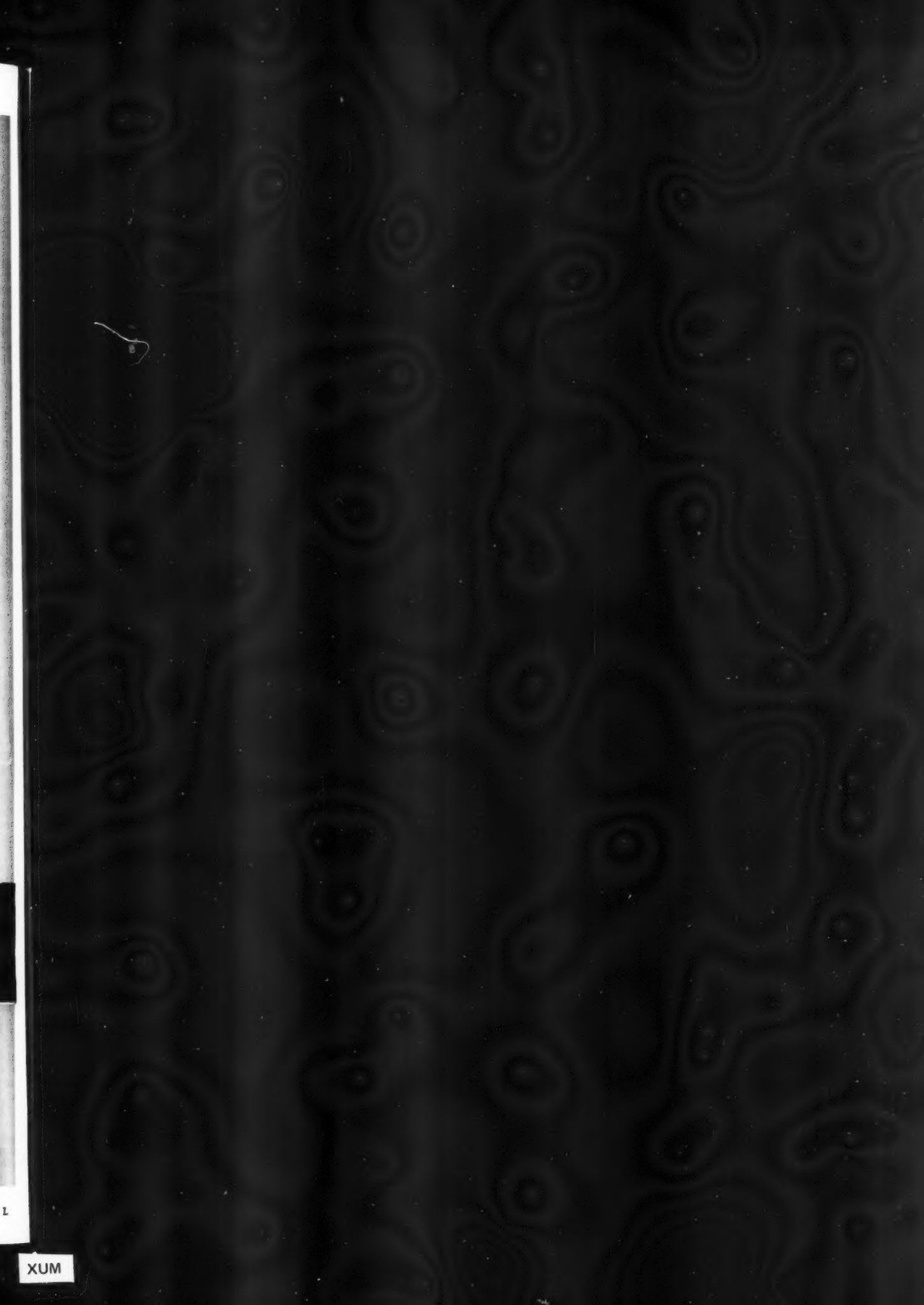

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JOURNALLY Speaking

Men versus Machines

HOW much should an oil company invest in plant and equipment and how much should it pay its employes?

Of course there is no standard formula for this, and the actual practice varies considerably among companies.

This variance has been called to our attention by a sharp-eyed reader in Texas, who spotted two advertisements in our issue of May 11. On page 4 Standard Oil Co. (Ind.) announced that its employes averaged $4,600 in wages and benefits last year and that for each employe the company had an investment of $30,100 in tools and equipment. On page 14 Standard Oil Co. of California announced that each of its employes averaged $4,083.81 in wages last year and that the company's investment in equipment was $41,073 per employe.

Does this mean that Standard of Cal employes are underpaid compared with those of Indiana Standard? Or that the California crowd is putting too much into equipment? Or that the Indiana company is lagging in labor-saving devices?

No such conclusions can be drawn from a comparison of these isolated figures, even though their juxtaposition is an intriguing coincidence. In the first place, the method of bookkeeping may differ between the two companies. More important, the two companies differ in their operations, in need for numbers of employes in different wage brackets, in type of plant investment required. For example, California has extensive foreign producing and marketing activities; Indiana doesn't.

To get an exact comparison it would be necessary to take comparable segments of each company, such as bulk plants or the accounting departments, and figure out the ratio of wages to investment in each. But there would be little point in this because it is a fair assumption that wherever the two companies compete they have to pay pretty much the same wage scales for comparable skills. It is also a safe bet that each company watches its investments and its pay scales pretty closely and is on its toes to get the maximum return from each.

That's the value of a competitive free-enterprise system, which forces every company to decide how much it should invest in men and how much in machines, and which gives the consumer the benefit of the resulting increases in efficiency of operation and quality of product. If industry were run by the Government there doubtless would be interminable hearings, laws, and regulations fixing the ratio of investment in equipment to dollar of wages paid. And the ratio might swing radically depending on whether labor or equipment manufacturers had the greater influence with the Government at the moment.

As far as we can see, only two definite conclusions can be drawn from this incident:

1. The oil industry pays pretty good wages but to do so it must invest tremendous sums in tools and equipment.

2. Our subscribers read Journal ads mighty closely.

Balls of Fuel

LAST week our favorite oil publication recorded the astounding intelligence that the Southwest Research Institute has developed a method of compounding gasoline and fuel oil into solid balls which can be shoveled like coal.

Now what in the world is the sense of that? Great balls of fire, man, that looks like a backward step to us. America abandoned the coal furnace and the horse because it didn't like to shovel things, and here comes a scheme to make us shovel our fuel oil and gasoline.

It is explained that the idea was suggested by the military, and that sounds logical. The kind of mind that can dream up an atom bomb and maybe a flying saucer may be able to figure out some advantage in a balled-up fuel supply.

—Henry D. Ralph

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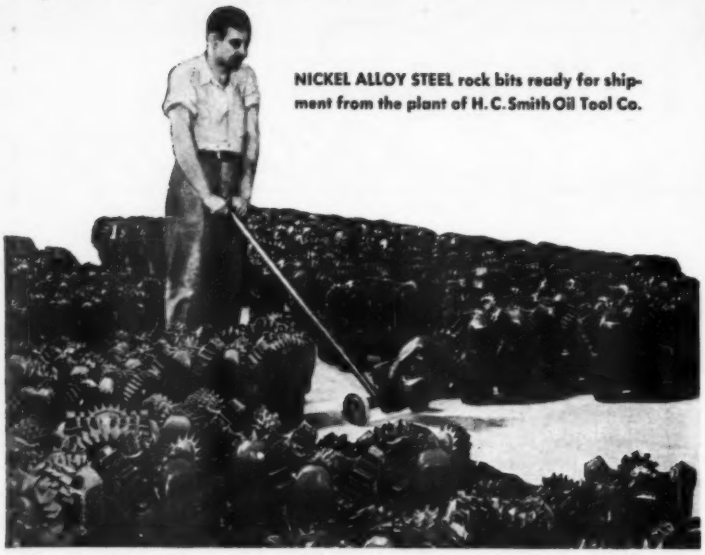

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How to combine STAMINA and COMPACTNESS in a rock bit

Stamina is vital in a rock bit . . .

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The main body, or shank, which functions as supporting head for the cutters, is cast in nickel alloy steel containing 1% nickel and smaller percentages of chromium and molybdenum.

The cutters are of nickel-chromium-molybdenum steel . . . case-hardened to provide a hard cutting edge resistant to abrasion.

The crossarms, which serve as bearing supports for the cutters, are nickel alloy steel forgings.

Metal problems differ, but the many standard grades of nickel alloyed steels permit selecting the particular type which provides the best combination of properties for specific fabrication and service demands. Send us details of your problems for our suggestions.

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TRADE MARK

Over the years, International Nickel has accumulated a fund of useful information on the properties, treatment, fabrication and performance of engineering alloy steels, stainless steels, cast irons, brasses, bronzes, nickel silver, cupro-nickel and other alloys containing nickel. This information is yours for the asking. Write for "List A" of available publications.

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BAKER CASING SCRAPING WILL SAVE YOU MONEY, AND TIME, AND TROUBLE

There now are two types of Baker Casing Scrapers which safely, efficiently and economically remove bullets, burrs, hardened cement or mud, and even mill scale from the important "working surface"—the inside wall of the casing.

The results are so satisfactory that many operators now consider the use of a Baker Casing Scraper a "must" in well completion, or after every gun-perforating job.

CHOOSE THE TYPE TO EXACTLY MEET YOUR NEEDS

While the rotary rig still is up, and only hardened cement or a limited number of gun-shot burrs are to be removed, the time-tested Baker MODEL "B" Casing Scraper (Product No. 620-B) is recommended. It is usually run just above the bit while drilling out cement, and will completely remove protruding burrs as well as the thin sheath of cement left even after the maximum gauge bit has been used for drilling out.

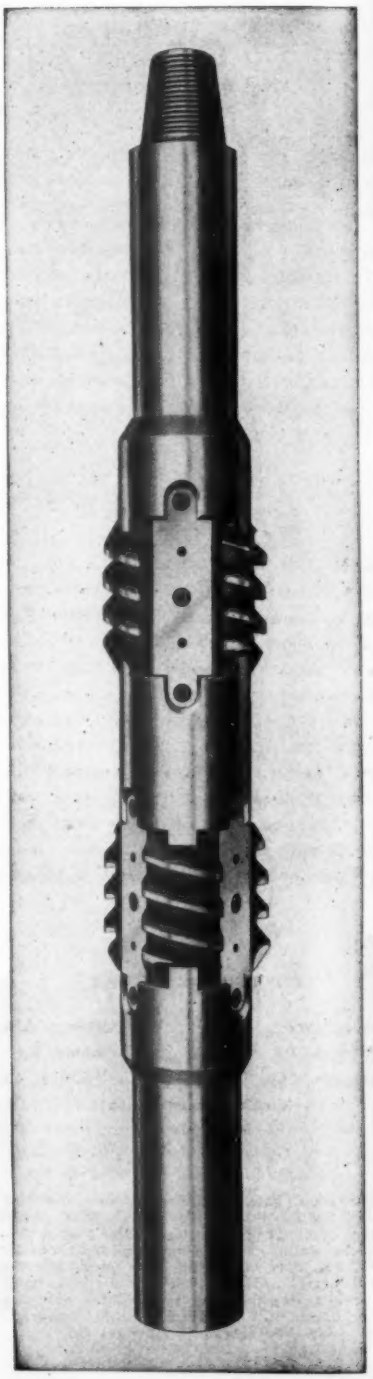
When there are several hundred gun-shot holes (with possible imbedded bullets); or if the hardened mud sheath is to be removed from top to bottom of the well, the new Baker ROTO-VERT Casing Scraper (Product No. 620-C) is recommended. The ROTO-VERT can be run on drill pipe for successful vertical scraping of obstructions as it is being lowered in the hole; followed by rotation if difficult well conditions make rotation necessary or desirable. Or it is run on tubing or a wire line for successful all-vertical scraping.

Either method leaves the inside wall of the casing "clean as a hound's tooth" safe for testing and completion, and ready also for all future down-hole work a year or ten years in the future.

NEW ROTO-VERT IS SAFE AND POSITIVE

The strong, simple construction of this efficient scraper is evident from the illustration which shows the rugged body on which six blade blocks are mounted, and held in position by blade block retainers. The blade blocks are set in two horizontal rows in a staggered position so that the blades overlap and will scrape the full 360° inside wall surface of the casing. The shearing edges are cut on a helix angle and provide a scraping, or shearing, action both while moving down the hole and while rotating. The thrust of each blade block, when rotating, is taken by a driving block which is welded to the body. Springs behind each blade block hold the heavily hard-faced cutting edges against the inner wall of the casing where they exert positive shearing action. ROTO-VERT blades will never screw down past a casing burr because their scraping edges follow the contour of a LEFT-HAND SCREW.

Contact the Baker representative in your area and find out how the reasonable rental is mighty cheap insurance for having *every* well in perfect condition for running tubing or liners, as well as any type of swab, tester, packer or cementing device.



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its way

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"Why Be Confused?"

The above heading appeared in a national magazine this week over an article giving views of government leaders as to the possibility of another world war. The opinions ranged from an assertion that another emergency was just around the corner to one which explained that we are farther removed from another war than at any time since the close of the last one.

It struck us that the same heading would be particularly suitable for a symposium on the Government's position in regard to oil and gas policy.

Coal interests want a 1,000 per cent hike in oil import rates to protect their products in a competitive price situation brought about by their own internal workings. Their legislative representatives seek higher natural-gas prices for the same reason.

But agricultural organizations contend that advances in import rates will destroy trade with the importing countries of which they are a major beneficiary. Consumers of natural gas brought about the Kerr bill veto on the contention that its approval would mean higher rates to them.

The Federal Trade Commission is asking for large appropriations to carry on an investigation of alleged monopolistic practices in the oil business. However, the commission's own statement shows that its request stems largely from those who in fact want less, not more, competition.

The letter to President Truman from Standard of California's Petersen on April 21—released last week—is apropos. The California executive pointed out that a federal grand jury last year, after a lengthy investigation of the West Coast oil industry, returned no indictments. Wrote Petersen:

"Therein lies the basis of our confusion: How are we to know in what respects the Department of Justice thinks we are violating a law unless that department tells us? . . . We are perfectly willing to conform to any reasonable suggestions the department is prepared to make to us."

Referring to Secretary Sawyer's oft-repeated promise that business men would be given the opportunity voluntarily to abandon illegal or questionable practices, Petersen wrote the President: "We had hoped Mr. Sawyer's program would lead the Department of Justice to consult with us and tell us wherein the department thought we were at fault, but the evidence we have at hand now is that this is merely the policy of the Department of Commerce and is at odds with the policy of the Department of Justice."

Despite the grand jury action, the promise of the Commerce Department, and the willingness of the oil industry voluntarily to consider the dropping of practices to which the Government objected, we have the broad suit against seven major California companies, with the official statement that similar action will be taken in other parts of the country.

Apparently our Washington leadership feels it is well in an election year to follow the lead of that mythical general who mounted his horse and galloped off in all directions.

XUM

THIS WEEK

IMPORTS—Showdown on imports demanded as congressional committees take up problem. . . . Spokesmen for I.P.A.A., oil states, farmers, coal industry request legislative restrictions. . . . Say importing companies may monopolize market. . . . ¶Jersey Standard head insists imports not the cause of decline in domestic production, restrictions not in interest of oil industry. . . .

WASHINGTON—Investigation fever raging again. . . . While one congressional committee hears demands for restriction of oil imports to prevent price declines, another group hears demands for investigation of high oil prices. . . . ¶Farm groups endorse Cannon resolution to finance all-out FTC investigation of alleged monopolistic practices in oil industry. . . . ¶House votes continuance of present synthetic-rubber program, retaining government ownership. . . .

ACTIVITY—Crude production averaged 5,062,375 bbl. daily for week ended May 27, up 8,925 bbl. daily from previous week and 156,250 bbl. daily from same week last year. . . . ¶Completions totaled 794 wells compared with 845 for previous week and 772 for same week in 1949. . . . Wildcat completions were up 26 wells for the week to 135. . . . ¶Rotary rigs operating in United States on May 22 set a new record for the year at 2,103 rigs, an increase of 47 rigs for the week or 74 rigs compared with same date last year. . . .

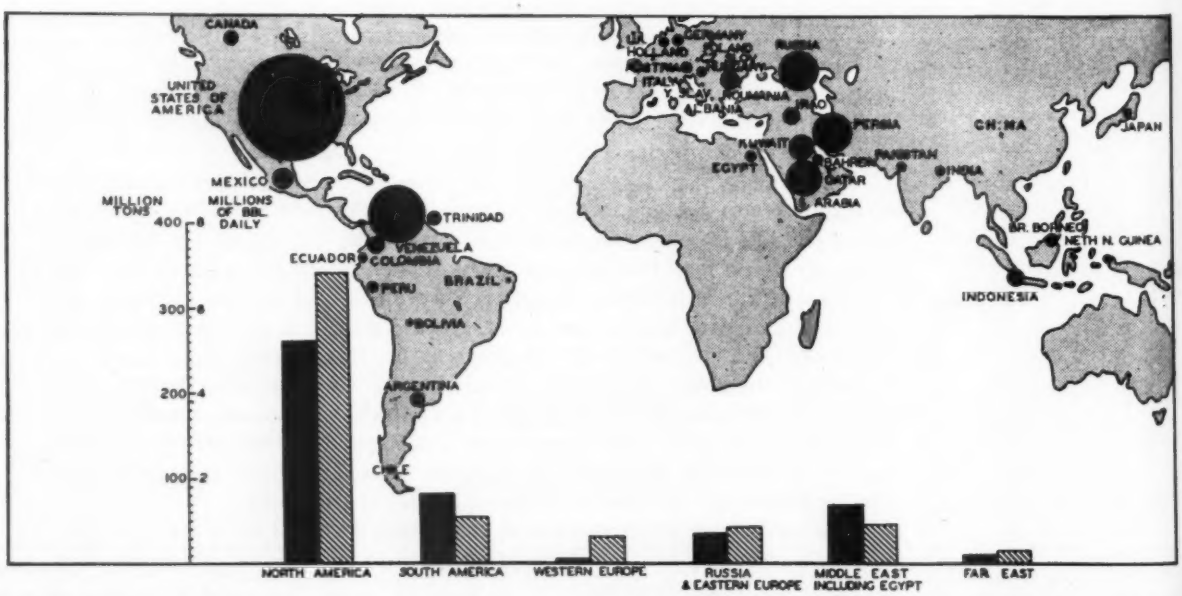
TRENDS—Crude runs at refineries for 4-week period ended May 20 exceeded runs in same period last year by 160,000 bbl. daily. . . . For same period, major-product stocks decreased 89,000 bbl. daily this year and increased 221,000 bbl. daily last year for a total difference of 310,000 bbl. daily. . . . Increased refinery production plus greater draft on stocks indicate a gain in demand for domestically produced products of about 470,000 bbl. daily. . . .

TECHNOLOGY—Use of supersonic waves advocated as chemical processing tool. . . . ¶Gas industry concentrating on techniques for making high B.t.u. gas and economical summer storage to meet peak-load problem. . . . ¶Interest growing in water flooding in Mid-Continent producing areas. . . .

INTERNATIONAL—Possible way of ending deadlock over sterling-dollar oil controversy seen in Standard-Vacuum agreement in Far East and in sterling deal by American companies in England which brings end to gasoline rationing. . . . ¶Caltex opens Europe's newest refinery at Pernis. . . . Capacity, 20,000 bbl. daily; cost, $18,000,000. . . . ¶British refinery construction program ahead of schedule. . . . ¶Colombia plans products pipe line to Bogota. . . .

NATURAL GAS—Texas Eastern signs record gas contract, providing for purchase from United Gas Pipe Line Co. of 134 billion cubic feet annually. . . . Gas involved destined for New England market. . . . ¶Texas Gas Transmission Corp. enters Louisiana Gulf Coast with acquisition of Louisiana Natural Gas Corp., plans line connecting two systems. . . .

REFINING—Socony-Vacuum completes expansion program at East St. Louis refinery providing net increase in capacity of 10,000 bbl. daily. . . . ¶Tiny crustaceans being used in project sponsored by Louisiana refiners to establish standards for testing refinery wastes involved in stream pollution. . . .



WORLD PICTURE.—Natt Magazine of Anglo-Iranian Oil Co., Ltd., uses this map to show the location of 1949 crude production and refining capacity. Production by countries is shown by circles of proportionate size. Solid bars show production and shaded bars show refining capacity, by areas, both based on the scale at the left. Many factors influence the choice between locating a refinery near the crude supply or near major consuming markets.

Worried Farmers

They're the ones who want an FTC oil investigation, and they have a long list of complaints, Cannon tells Harris

WASHINGTON.—The big farm organizations are responsible for Rep. Cannon's request for a full investigation of the oil industry by the Federal Trade Commission, the Missouri congressman disclosed last week.

Cannon, appearing before the House interstate commerce oil subcommittee to urge approval of his resolution, told subcommittee chairman Oren Harris of Arkansas that oil is essential on the farm and farmers want "a free and competitive market for oil products."

Cannon, chairman of the powerful House appropriations committee, indicated the commission would have no difficulty in getting the $250,000 which the resolution would provide to start the investigation of such further sums as might be necessary to complete it.

Reception cool.—There were indications that Harris and some other members of the committee did not look upon the FTC investigation with approval, believing that their own committee probably could do a better job.

Harris, in fact, pointed out that he introduced a bill last year for creation of a national oil policy council to set the policy which Cannon would have the FTC outline, and asked all the departments and agencies having to deal with oil, including the FTC, for their views. Ten months have elapsed, he told Cannon, and as yet none of the agencies has given the committee a report on the bill.

Cannon told the subcommittee four major points that would be developed by the proposed investigation—whether there is monopoly in the production of crude oil, whether the Interstate Oil Compact has been used as a means of controlling output and price, whether percentage depletion is working to the advantage of the big companies and the disadvantage of small ones, and whether the ownership by American interests of foreign fields is working to the detriment of the domestic industry.

Farm testimony.—Representatives of the farmers' organizations whom Cannon introduced as witnesses leveled a long list of charges against the industry, practically all of which have been hashed and rehashed in Congress many times over many years.

They told the subcommittee a full-scale investigation should be made to determine whether the industry is dominated and controlled by a handful of major oil companies. They declared that unless something is done by the federal Government a few corporations in the not too distant future will own the industry lock, stock, and barrel.

They buttressed this contention with statistics indicating the increased ownership of crude reserves by the majors, charging that much of this is the result of a squeeze play on independent refiners who have to purchase crude. They bore down heavily on the fact that following the repeal of price control the price of crude more than doubled. Even when product prices fell in 1949, the price of crude remained constant, it was pointed out.

"It would naturally be assumed that in a period of apparent oversupply of refined petroleum products and a much lower refinery selling price, the cost of crude oil would, by the operation of the simple law of supply and demand, have dropped," A. D. Sappington, general counsel for the Missouri Farmers Association, said. "But it did not drop."

Co-ops concerned.—The farm cooperatives, some of which have oil businesses, are concerned over the possibilities that the state conservation agencies are using allowables for the purpose of fixing crude prices and that the Interstate Oil Compact is being used for a similar purpose or to create or perpetuate a monopoly, the subcommittee was told.

These activities, it was declared, appear to tie in with imports, which were increased during a period when domestic production was being curtailed.

"The imports of cheap foreign oil by the major oil companies, together with their ownership of their own supply of crude oil in this country, placed the major oil companies, during the last year and a half, at a great advantage over the independent refineries which were not in a position to import cheap foreign oils and did not own their own oil production," Sappington declared.

Also, he said, another condition that needs investigation is the apparent effect the location of a refinery seems to have on the prices at which products are sold, with higher prices for products at refineries in the East and North as compared with those in the Mid-Continent area.

The difference in prices does not appear to have much correlation with the difference in the cost of crude delivered to refineries in various locations, raising the question why product prices are not fixed on the basis of crude cost rather than the particular area in which a refinery is located, he said.

Depletion supported.—The farm organizations, on the whole, supported the oil industry's 27½ per cent depletion allowance as "fair and necessary to protect the independent oil producer and encourage the discovery of new oil," but it was suggested the allowance might be increased for independents engaged in marginal production and an inquiry might be made to determine whether the present allowance has been a factor encouraging the major companies to acquire the country's crude reserves.

Farmer representatives held that an FTC investigation developing all the factors of monopoly would be a better basis for action to eliminate it than are the cases brought by the Department of Justice under the antitrust laws, and these cases in themselves demonstrate the need for a complete and impartial investigation of the whole industry by the Government.

The antitrust cases, it was asserted, are "tedious and long drawn out" and will never completely and fully solve the problem.

Rubber "No"

House rejects President's synthetics-facilities plan

WASHINGTON.—Rejecting the President's proposals for disposition of the Government's war-built synthetic-rubber industry, the House has approved continuation of the present law for another 3 years. The Senate is expected to go along with that program in the near future.

Extension of the present act, passed in 1948, was voted without sufficient opposition to necessitate a roll call.

The legislation requires the Government to retain ownership of 28 synthetic-rubber plants and keep 17 of them in operation, and to continue existing controls. The President is required to submit a new plan for disposition of the industry before the extension expires.

(For details of the President's plan, see The Oil and Gas Journal, January 19, page 34. For a summary of industry's opposition to it, see the March 2 issue, page 30).

Consideration of the measure came at a time when world demand is outrunning world supply. Raw rubber prices have recently advanced more

XUM

than a third, due primarily to record demand for tires, stockpiling by the Government, and heavy Russian buying which indicates that the soviets also are stockpiling rubber.

British and Dutch rubber producers are making a drive for expanded United States markets and have set up an organization here to handle it, including an extensive advertising campaign. Foam rubber (for cushions, mattresses, etc.) has become a big item with the natural-crude producers, but they are fearful of the effect of substantial price increases which will turn manufacturers to the use of synthetic rubber, demand for which is increasing rapidly.

Production of butadiene from petroleum declined last year to 494,000,000 pounds from 661,000,000 lb. in 1948, according to Tariff Commission statistics, but is believed now to be again on the upgrade.

In the view of Congress the disposal program sent to the Capitol by the President did not meet the needs of the situation, and the House decided to go along under the present law until June 30, 1953, by which time the international situation may have settled down, both with respect to defense and rubber production, and a disposal plan geared to new and more stable conditions may be possible.

Imports Attacked

Oil, coal, farm interests tell congressmen foreign oil is wreaking havoc with domestic industry, ask restrictions

Bertram F. Linz

WASHINGTON.—Demands for immediate action to curb oil imports were voiced on both sides of the Capitol last week on behalf of the domestic oil, coal, railroad, and food producers.

But even as representatives of the Independent Petroleum Association of America were outlining the disadvantages under which oil producers are operating as a result of imports, Sen. Robert A. Taft of Ohio, Republican member of a Senate labor subcommittee which is studying the effects of imports on employment, warned that the foreign trade policies of the administration would make congressional action difficult.

Appeals for help in curbing imports were sounded before both the Senate subcommittee headed by Sen. Matthew M. Neely of West Virginia and the House interstate commerce oil subcommittee, which was conducting a hearing on a proposed Federal Trade Commission investigation of the oil industry.

Three suggestions.—The case of the domestic oil interests was presented to the Senate subcommittee by four spokesmen from the I.P.A.A. who outlined three alternative ways of dealing with the situation—establishment of a quota on imports, an increase to $1.05 per bbl. in the excise duty on imports, or a requirement that imports and exports of oil be balanced.

Curtailment of production and the closing down of refineries in various areas was described to the subcommittee by H. B. Fell, president of Simpson-Fell Oil Co., Ardmore, Okla., and executive vice president of the I.P.A.A.; R. G. Lawton, vice president of McAlester Fuel Co., Magnolia, Ark.; O. C. Bailey, chairman of the Arkansas Oil and Gas Commission, and M. R. McArthur, vice president of Husky Refining Co., Cody, Wyo.

Fell said unemployment and other disruptions in the industry caused by "excessive imports" is not a passing problem. Both economical and political pressures will become more severe if a "proper policy" is not developed now.

He warned the Senate body that as foreign oil displaces domestic oil "we as a nation are shifting our dependence for an oil supply from the thousands of domestic producers to a monopolistic combine of a few companies."

"The foreign oil monopoly now being encouraged by oil imports," Fell said, "if permitted to run its course, will mean higher prices to consumers, an uncertain supply, and in the end government control."

Bailey testified that in Arkansas, alone, imports last year caused a reduction of more than $200,000 in severance taxes to the state, a loss of $3,500,000 in the income of producers and royalty owners, and a 1,500,000-bbl. drop in runs to stills in the state's six refineries.

"The continued upward trend in imports . . . indicates very clearly that the only way in which imports will be restricted will be through action by the federal Government," Bailey asserted.

Lawton told the subcommittee that current income of his company is one-third under that of a year ago, necessitating the stacking of rigs.

McArthur reported that exploration has been reduced in Wyoming and that several heavy-oil fields have been shut in. His own company, he said, is being penalized by the lowered price of crude on its own production but is able to offset the loss partly by buying some of its needs from other producers. However, he added, drilling rigs owned by the company have been leased to others and employment has been cut from 224 to 157 persons.

Farmers' worries.—Before the House subcommittee, representatives of important farm organizations supported the industry's opposition to imports.

While they expressed concern lest independent operators and refiners be forced out of business, they were mainly aroused to the possibility that elimination of the independents would be followed by increases in oil product prices for which, they said, the farmers spend $1,500,000,000 a year or about 8½ per cent of the total farm production costs.

Coal's complaints. — Spokesmen for the coal industry who testified before the Neely subcommittee laid responsibility for all their ills upon imported residual fuel oil, brushing aside all suggestions that repeated interruptions of coal production might have been a factor influencing utilities and other consumers to convert from coal to oil.

Thomas Kennedy, vice president of the Lewis-dominated United Mine Workers of America, told Neely that the curbing of oil imports would allow the coal industry to compete again with other domestic fuels, but D. T. Buckley of the National Coal Association, the operators' organization, was less optimistic, expressing the view that the oil companies would hang on to the new markets they have acquired.

Those markets, Buckley charged, were successfully invaded by manipulating the price of oil, and while the companies now "glibly indicate their willingness to curtail importation of oil" on a voluntary basis "presumably they mean to retain all of the tonnage which they have already secured."

Miners and operators alike emphasized the necessity for keeping the coal industry in healthy condition as a national security measure and pointed to the experience of the last war when, they contended, bituminous coal had to step in to fill the breach occasioned by the oil shortage resulting from German submarine attacks on our tankers.

Buckley told the subcommittee the industry wants government, not voluntary company, action to curb imports of oil.

Not all criticism.—All of the argument submitted to the subcommittee, however, was not on the side of limiting imports. Splitting with organizations which were critical of imports before the Harris subcommittee, the American Farm Bureau Federation took the position that any action taken by Congress to limit imports would impair our balance of trade with Venezuela.

The Federation admitted frankly that it was looking at the situation from the standpoint of agriculture which, it said, is greatly dependent upon the maintenance of exports at a high level. Venezuela is a large importer of United States agricul-

tural products and, said the federation in letters to the members of the Neely subcommittee, "we do not believe that sufficient evidence can be presented by those promoting this legislation to justify the imposition of greatly increased tariffs or quota restrictions."

One side only.—Neely, however, made it clear he was not interested in hearing any testimony attempting to justify imports. He announced he did not plan to call any representatives of the importers or State Department officials, who are anxious that he get their side of the story.

Imports Defended

Jersey Standard files 19-page statement, says imports had nothing to do with cutbacks in domestic production

Dahl M. Duff

ADDITIONAL restrictions on petroleum imports would be contrary to the best interests of the oil industry, its customers, and the country as a whole, Standard Oil Co. (N. J). said last week.

The company filed a 19-page statement on the subject with the House oil imports subcommittee in Washington, and later outlined its position in a discussion in New York by Eugene Holman, Jersey Standard president.

The material presented drew together and clarified points that have been made in refutation of the arguments of independent oil and coal producing interests who are campaigning in Congress for a higher oil tariff or a quota system.

Holman said restrictions such as the proposed increase in tariff from 10½ cents to $1.05 a barrel would amount to a "virtual embargo." He said he regarded a quota system as something equally undesirable and likely to lead into broader federal control of the industry.

Misstatements criticized. — He conceded that the company was concerned over the situation but added that it was primarily because of its firm conviction that the country should not be dependent on any one source of energy. Many misstatements have been made, he said, and petroleum imports have been put in the position of a "whipping boy" for the difficulties of competing fuel industries.

Holman said the company knew the factual and statistical material it was offering was correct and believed the conclusions drawn from it also were correct. Among these were the following:

There are several reasons for the decrease in domestic oil production in 1949, and imports is not one of them. A cutback in the maximum productive capacity in 1949 was inevitable after several years of all-out expansion and rebuilding of inventories to overflowing. Development of production and refining abroad caused exports to decline, further affecting domestic production.

Residual fuel-oil imports are entirely different from other petroleum imports, and should be considered separately. This is due to the fact that by far the greatest part of heavy fuel-oil imports are used on the East Coast where it meets a demand that cannot be economically supplied by domestic sources. If this marginal demand for fuel oil were met from domestic sources, production of lighter products would greatly exceed requirements.

Coal men answered.—The problems of the coal industry are not due primarily to the import of heavy fuel oil. Both coal and residual have lost and are losing markets to natural gas and railroad diesel in the changing pattern of the over-all energy sources of the country.

Besides this, coal lost much of its export market and has been partly displaced from the home-heating field by petroleum distillates, which, however, are refined almost entirely from domestic crude.

A number of other points in opposition to petroleum import restrictions also were mentioned. These include requirements of military security, necessity for building up some level of reserve domestic producing capacity, need for promotion world-trade, and continuing the incentive for American investment in foreign areas. Holman remarked that the impression had been left in some quarters that the military during the war depended entirely on domestic oil.

Company statement.—"Legislation or executive orders which imposed a rigid formula on the rate, or which increased the price at which oil enters this country, would limit flexibility in meeting variations in domestic demand, jeopardize relations with friendly nations, and lessen the incentive for Americans to enlarge foreign investments, the statement said.

"Any such action would be a backward step in American aspirations toward freer and large world trade. Moreover, any such action would foreshadow still further government controls and a stultifying of the initiative and independence that have made the American oil industry a leader in inventiveness and technical progress. . . .

"Any attempt to erect an oil-tight dike around the nation and to bar

GADABOUT RIG.—The scenery is quite a change for this rig of Humble Oil & Refining Co., which before this location was drilling in the Gulf of Mexico. It is now on the northwest edge of Yarbrough & Allen field in Southwest Ector County, and is the first Humble rig to operate in West Texas since 1943. While the derrick and draw works came from a test off the Louisiana Coast, the mud pumps were brought in from Galveston Bay, the mud tanks were shipped in from Corpus Christi, and the motor generators were taken from a crane on an offshore L.S.T.

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the American consumer from access to oil from abroad would not serve the interests of consumers or the country's economy as a whole. Conversely, the best interests of the United States would not be served by a 'flood' of imported oil, even if such flood were physically and financially possible, since such an occurrence would disrupt domestic energy industries to the long-run disadvantage of the nation."

The Jersey Standard president said a rising domestic demand for petroleum products will require greater domestic production and also an expanding volume of imports. "We do not believe these two things are incompatible nor that domestic production and oil imports must follow opposite trends," he said.

Jersey's policy.—The company summed up its import policy in a three-point statement: (1) with domestic crude in good supply, imports of crude are being kept to a minimum consistent with the maintenance of its foreign sources of oil for the purposes stated; (2) the company plans to import residual fuel oil to the extent that the domestic supply economically available to it is not sufficient to meet demand of its customers; and (3) the company will do its best to maintain its properties overseas as sound investments for its stockholders.

In connection with the third point, it said that the foreign sources of oil were acquired primarily for the supply of foreign markets and are also sources of special crudes which are not obtainable domestically. Furthermore, they are protection to oil consumers against short-term peaks in demand in this country resulting from abnormal weather or other factors.

Asked for his opinion as to what would happen to oil prices if imports restrictions were made effective, Holman said he felt that they would eventually increase. Fuel oil, he added, would certainly increase in price.

SOUTHWEST

Texmass Reorganized

DALLAS.—Texmass Petroleum Co. has completed its reorganization into Texas Consolidated Oils, Inc.

A. W. Kincade, president of the Fourth National Bank of Wichita, Kans., was elected president and chairman of the board of the new firm.

The reorganization brought together the producing properties of Petroleum Reserve Corp., Swiss Oil Co., Midway Oil Co., Inc., National Cooperative Refining Co., and the Smith-Miller partnership.

The Texmass action climaxed

WATCHING WASHINGTON

Bertram F. Linz

No Time to Lose

Warning that the "cold war" is at anything but a low temperature, new National Security Resources Board Chairman W. Stuart Symington is telling industry that no time should be lost in planning for national mobilization.

Symington does not say that war is imminent or even expected in the foreseeable future, but he has pointed out that we are in a new era in which formal declarations of war may be a thing of the past, and world conditions are not far different from what they were prior to the last war.

In his first formal discussion of his problem since becoming head of the NSRB, Symington told the Committee for Economic Development that he hoped to release more and better information to the public regarding the board's activities than has been made available in the past; but it remains to be seen how far he will be able to go in the event of resistance from the cabinet members of the board who, while relegated to a purely advisory position by President Truman's reorganization order placing all responsibility in the chairman, will still be able to exercise considerable influence over the classification of information.

Emergency controls in the next war may be far more comprehensive and restrictive than any the country has experienced in the past and will be imposed practically overnight, Symington predicted, because attack by an enemy may come with a warning measured only in hours, depriving the country of the advantage it held in the last two wars of having several years in which to get ready.

Middle East Defense

Only a few years ago, when congressional committees were investigating American oil development in the Middle East, it was predicted that the United States would eventually find itself committed to protection of that area and it looks now as though there was some merit in those predictions.

True, Uncle Sam is merely sticking his toes into the water by agreeing to provide arms with which the Arab states can protect themselves against aggression, but by doing so he may be starting to take over from the British their job of defending the Middle East.

Since the war the British have been worried about the expense of protecting this great segment of the world's oil lands, lying within easy air reach of Russia but remote from British or American bases from which it could be adequately supplied or defended in the event of what officials denominate an "emergency" but the rest of us call "war."

In the announcement that the United States, Britain, and France had agreed to supply arms to the Middle East no reference was made of its strategic importance, but there could be no doubt that this was a major consideration, since it is believed the decision was based upon assurances that peace would be maintained between the Arab states and Israel.

270 Billion in 1950

It is now possible for everybody in the United States to go for an auto ride at the same time, but the traffic jam would be devastating.

Motor-vehicle production for the first 4 months this year—with Chrysler plants shut down for most of the time—hit a new high record at 2,196,802 units, the first time since 1929 that the 2,000,000 mark has been passed in the first third of the year.

In that period 1,706,300 new passenger cars hit the road, nearly 330,000 more than in the same time last year. That would indicate that something like 4,000,000 new automobiles may be put on the highway this year, making allowance for a slump in sales next fall.

The nation's truck fleet was increased by 358,420 units during the 4-month period, which was 13,000 less than last year, together with 726 motor coaches, 1,100 less than in 1949.

All told 2,119,469 vehicles were sold on the domestic market and 77,333 were exported to make a record of 136,000 more than the previous peak, according to the manufacturers' figures.

The Bureau of Public Roads recently came up with its figures on 1949 registrations—36,292,703 private automobiles and 44,670,586 motor vehicles of all kinds.

There were some 3,500,000 more vehicles on the road at the close of 1949 than at the end of 1948.

At an average of 7,500 miles a car, those 36,000,000 passenger autos will travel 270,000,000,000 miles this year, about 175,000,000 of them on city streets.

several months of controversy over a loan negotiated by the company with Reconstruction Finance Corp.

Wentz Properties Sold

Producing properties of the L. H. Wentz Estate, Ponca City, Okla., in Ector and Crane counties of West Texas have been sold in separate transactions to R. F. Windforh and the Fleming Foundation, Fort Worth.

The Fleming Foundation acquired 36 producing wells in Harper field of Ector County for a reported $350,000. Production is about 200 bbl. daily.

Windforh reportedly paid $495,000 for 10 producing wells in Sand Hills McKnight field of Crane County. Current net production is about 300 bbl. daily.

TECHNOLOGY

Bugs Aid Refineries

Tiny stream denizens help control pollution in joint project of Louisiana refineries and state authorities

BATON ROUGE.—A colony of "educated bugs" at Louisiana State University is hard at work testing refinery wastes and preventing stream pollution.

Not really bugs but a common crustacean called Daphnia Magnus, these tiny creatures are more sensitive than fish to poisonous concentrations of chemicals in wastes which Louisiana refineries dump into streams.

This form of stream life, which resembles a small crawfish, is the basis of a new approach to the problem of evaluating the toxicity of refinery effluents. This is one of the cooperative research projects sponsored by the Louisiana Petroleum Refiners' Waste Control Council and the state Department of Wildlife and Fisheries.

The daphnia provide numerous advantages over fish for continuous studies of this type. Ranging in length from 1 to 5 millimeters, they are visible to the naked eye and will photograph easily. The university laboratory maintains a pure strain by careful culture. An abundant supply is guaranteed by the fact that the daphnia reproduce 20 young every 3 days.

Groups of specimens are exposed to varying concentrations of the chemicals found in refinery wastes, and the results show the tolerances of stream life for these forms of pollution.

University officials believe that the results of this study will provide a correlation between the tolerances of daphnia and bluegill and other fish, which have been similarly tested. Establishment of such correlations will allow standards to be set on the basis of daphnia, which will greatly expedite future test work.

The small crustaceans themselves represent a sound basis for such studies, as they constitute a main source of fish food. The basic research at L.S.U. is being supplemented by additional studies at aquariums established at some of the refineries.

Model project.—The pollution-control work of the Louisiana refiners and the fisheries department is considered a model of industry-government cooperation. Now in its sixth year, it provides an open forum for comparing data and techniques, as well as supporting research projects.

Creation of the council was sponsored by the Stream Control Commission of the state, and its membership now represents 95 per cent of the refining capacity of Louisiana. The council meets quarterly, and representatives of the fisheries department and L.S.U. take an active part in the meetings.

Day-long meetings are held in rotation at refineries of the member companies, and at L.S.U. Morning sessions are devoted to papers, prepared by engineers of the host refinery, on separator-system design and other pollution preventive facilities, laboratory work being conducted on the problem, characteristics of the various streams leaving the refinery, and engineering plans for new equipment and methods designed to improve pollution control. Important papers presented elsewhere on waste disposal are often read or reviewed. Discussions following these presentations comprise a refiners' forum on the subject.

The director of the statistical and research department of the state Department of Wildlife and Fisheries makes a report covering any conditions in the state which are unsatisfactory, and further discusses any solutions to pollution problems which might aid refiners. Since he is responsible by law for determining what conditions in the state constitute pollution, his participation serves to keep refiners fully informed on the standards required by federal and state law. At the same time he becomes acquainted with the work being done in the industry, which

Stream-pollution research at L.S.U.: Dr. H. J. Bennett, Ira Fowler, Dr. O. W. Rosewall, and Dr. P. G. Sellner making a toxicity test with Daphnia Magna. In the circle are a couple of daphnia in a test tube.

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permits him better to evaluate and answer any outside complaints charging industrial stream pollution.

Research work is being conducted by two group-sponsored fellowships at L.S.U. Progress reports on these studies are presented at each meeting. The informal morning sessions conclude with a brief business meeting, and afternoons are usually devoted to inspection of refinery separators, test aquariums, and laboratory facilities.

Gas Research

Storage and supplemental sources studied by A.G.A.

George Weber

NEW YORK.—Methods of storing natural gas for peak-load demand and techniques for making high-B.t.u. gas to supplement natural gas were the chief topics of discussion at the annual production and chemical conference of the technical section of the American Gas Association here May 22-24.

The association's general research planning committee reported on the sixth year of cooperative research. T. L. Robey, secretary of the committee, outlined the work on seven current projects dealing with natural-gas problems from well production to delivery to the distributor's system.

The oldest project under this classification of general technical research deals with the controlling and gaging of combination oil and gas wells, characteristics of product fluids, well friction factors, factors influencing productivity, and back-pressure testing of large-capacity and high-pressure gas and gas-condensate wells.

Pipe-line problems.—Delivery capacities of new, high-pressure, large-diameter lines far in excess of those predicted by existing pipe-line flow formulas are being studied in an effort to develop accurate formulas for predicting capacity, with a secondary objective of evolving a yardstick for the measurement of hydraulic roughness of lines. Nitrogen removal, water-vapor measurement, and orifice-meter requirements round out the association's research program in this class.

Gas-production research includes studies of fluidization, catalysts, oil gasification, interchangeability of oil and natural gases, and mixed-gas research. An important project, now concluded, concerned the Hall high-B.t.u. oil-gas process. The application of the regenerative principle to the gasification of heavy oil (residual fuel) having Conradson carbon value up to 13 per cent was successfully demonstrated.

Storage costs.—In a report of East Ohio Gas Co.'s experience in underground storage of natural gas, F. E.

ALONG THE GULF

Leigh S. McCaslin, Jr.

More Lines Planned

HOUSTON.—Additional big gas lines are being promoted in spite of the President's veto of the Kerr bill, the near completion of Transcontinental Gas Pipe Line Corp.'s huge line, and the scheduled big-inch gas lines of Texas Illinois Gas Pipeline Co. and Trunkline Gas Supply Co.

In Houston it is reported that Curtis Dall, onetime son-in-law of Franklin Roosevelt, and a Houston oil man, are making plans for a new transcontinental artery. Name of the new company would be Valley Gas Pipeline Co.

Down in New Orleans, Delta Power & Gas Co., Inc., has been dickering with large gas producers for some weeks to secure contracts for 300 million cubic feet of gas daily. This gas would be used intrastate in two new lines which Delta has under consideration. The first would run from the gas fields in Plaquemines Parish, south of New Orleans, to Big Point field in Lake Ponchartrain, immediately north of the city. The second line would originate in Tepetate field, some 150 miles west of New Orleans, and tie into the first artery at Big Point.

Delta Power is only 2 years old and is a relatively small concern with a small gas line and electric plant serving Plaquemines Parish. J. E. Pottharst, New Orleans industrialist and banker, is president of the company.

Concern Over Price

Still another item on gas concerns the letter received recently by an industrial engineer with one of the Gulf Coast's largest gas companies. This engineer had been supplying a big eastern manufacturer with detailed facts and figures on gas in the Gulf Coast. The manufacturer intends to build a branch plant and was hopeful of obtaining a low-cost fuel supply in the form of natural gas.

Apparently, however, he had been talking to companies who moved to the Gulf Coast a year or two ago. He was expecting to get gas for about 5 or 6 cents per thousand cubic feet. Ten or 11 cents is more nearly the "going" price now.

When the eastern manufacturer was informed of present gas prices, he sat down and wrote the engineer a strong "scolding" letter. Using the style of a college lecturer, he proceeded to tell his Gulf Coast correspondent that the area was pricing itself out of new industry—to paraphrase.

The easterner's concern has been expressed by many local people in recent months. Low-cost natural gas probably has been the most important single factor in the amazing industrial growth of the Gulf Coast. It is quite possible that rising gas prices will slow the "boom."

Public Concern

The A.P.I. public-relations committee has one strong convert. A Houston oil firm has just completed a large crude-oil pipe line which terminates near this city. One of the ways in which the company could save money on the job was by "double-jointing" the pipe—welding two of the 40-ft. joints together in its Houston yard before stringing the pipe along the route.

Despite the economics of the situation, the company decided against double-jointing on the grounds that it would be poor public relations. It was felt that (1) the driving public might be endangered by the 80-ft. loads and (2) the same public might feel that such heavy loads were damaging the highways.

Source of School Funds

Oil royalty payments and cash bonuses on state-owned lands have accounted for most of the quarter of a billion dollars which is now in Texas' two permanent school funds. However, such natural resources as Cadelilla weeds (used for making sealing wax), "sulfur earth" (used for fertilizer), sodium sulfate (to feed cattle), Lechugiolla weeds (which someone hopes will yield sap for furniture varnish and fiber for brushes), and clay (for drilling mud) have also contributed.

New Field for Geologists

Humble overlooked no possibilities while building its new 18-in. line from West Texas to Houston. (Just completed). Two field geologists followed the ditch of the new pipe line during the entire construction period. Their job in the shallow excavation was to study and map the formations and bag samples for further laboratory analysis.

It is reported they are well satisfied with the knowledge gained and will follow the same practice on future pipe lines.

Vandaveer and J. J. Schmidt reviewed various methods of gas storage and presented the figures on estimated costs shown in Table 1.

The paper, supported by an extensive bibliography, discussed the company's eastern Ohio storage fields presently totaling about 33 billion cubic feet capacity, and reported on a new method for testing underground migration of gas.

Probable costs of $20-$22 per M.c.f. of installed storage capacity for the newly developed Methanite adsorption of methane on fuller's earth, were cited as part of the builders' committee report, which outlined new developments of 10 prominent manufacturers serving the gas industry. Elemental-sulfur recovery at costs competitive with that mined in the Gulf Coast were reported for new plants which operate in conjunction with gas-desulfurization plants.

The Bureau of Mines reported on a long-term survey of proved minable coking-coal reserves in this country, their basic washing characteristics, and their basic coking characteristics. Looking to the eventual substitution of high-B.t.u. coal gas for natural gas, the bureau stated that 5 to 10 years of research and development were needed.

TABLE 1

Type of storage—	Cost per M.c.f.
Sphere (80 psi.)	$227.00
Steel pipe (2,240 psi.)	207.00
Gas holder (low pressure)	156.00
Steel pipe (1,560 psi.)	48.00
Natural gas in propane	32.00
Liquefaction	13.00
L.P.G.-Air (1,000 B.t.u.)	7.50
Catalytic reforming (1,000 B.t.u.)	3.75
Salt-cavity storage	1.42
Depleted wells	1.25
Water sand	.53
Underground (13 fields)	.02-.50

Sound as a Tool

Chemist says ultrasonics applicable to processing

George Weber

SWAMPSCOTT, Mass.—Sound waves of high frequency have many potential industrial applications in chemical processing but as yet these possibilities have been explored only in a preliminary way, it was reported to the regional meeting of the American Institute of Chemical Engineers here May 28-31.

A symposium on ultrasonics underscored the conspicuous lack of industrial use of this new tool. So far ultrasonics has been used chiefly in testing and measuring devices and for the coagulation of fog and smoke, but Karl Sollner of the National Institute of Health, Bethesda, Md., declared that ultrasonics has great possibilities as applied to chemical processing.

Both audible and ultrasonic sound waves, he said, bring about dispersion effects, mutual emulsification of two bulk-liquid phases, disintegration of certain solids, peptization, liquefaction of thixotropic gels, depolymerization of high-molecular substances, and formation of fogs. On the other hand, the sound waves also cause accumulation, aggregation, and coagulation in liquid as well as in gaseous systems, and favor crystallization from solutions.

A clear understanding of the mechanisms of such phenomena and the construction of equipment appropriate for industrial use must precede efficient and economical application of this technique to processing, he added.

On the other hand, the use of ultrasonics in materials-testing and gaging has reached a solid commercial footing, according to Benson Carlin of Smith-Meeker Engineering Co., New York. He listed three techniques: the use of continuous waves passed through a material, the pulse techniques, and the employment of resonance effects.

Pulsations are short, lasting a few microseconds. Their transmission or reflection and time of travel are measured to indicate thickness or presence of internal flaws. Varying of the frequency of the sound waves is used to determine the resonance of the material, and therefore its thickness, he explained.

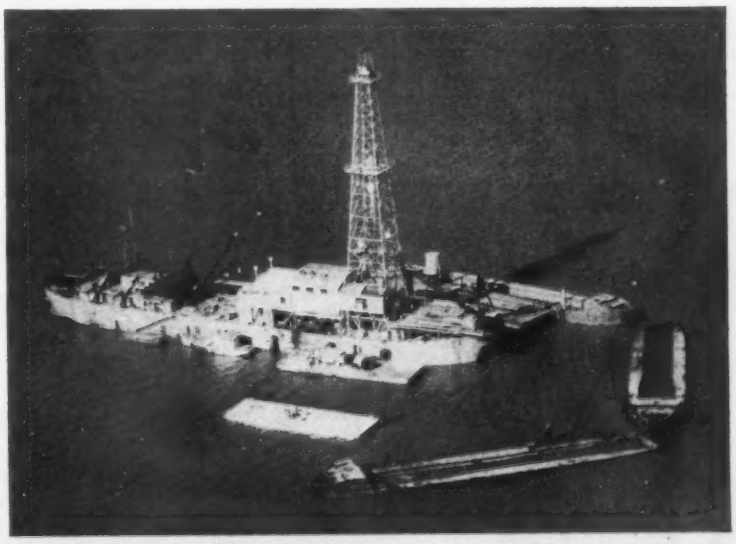
These nondestructive tests find application in ordinary plant inspection during fabrication, periodic testing of equipment in use, and repair testing to check serviceability of equipment parts.

Fluid catalysts.—At a symposium on fluidization, special emphasis was put on studies of the chemical-reaction aspects of the fluidized-powder process rather than the physical characteristics of the operation.

Noland Poffenberger and Robert Spencer, of Dow Chemical Co., reported on methods of calculating the average activity of a moving bed of fluid catalyst, based on the decline in activity and selectivity of catalysts with use, and the attrition rate. They observed that elaborate recovery systems and expenditures to obtain more abrasion-resistant catalysts may prove uneconomical, since fresh catalyst additions are constantly necessary to maintain proper activity in the fluidized bed. This is confirmed in the design of several modern fluid-catalyst cracking units.

Another study of fluidized beds concerned the uniformity of fluidization. Instantaneous variations of electrical capacity of bubbles, lumps, and slugs passing between two small plates, forming an electrical condenser immersed in the bed, gave investigators of E. I. du Pont de Nemours & Co. a means of measuring the uniformity of "boiling beds" and evaluating efficiency of reactor designs.

Another factor in fluidized-bed efficiency—the degree of undesirable bypassing and back-mixing of the vapor with the catalyst—was studied and reported by three engineers of Shell Oil Co., Houston. Their findings on studies of a 40-ft. commercial catalytic regenerator at the Deer Park refinery permitted determination of axial and transverse concentration gradients.



***DEEP TEST.**—Another offshore discovery was chalked up for Shell Oil Co. with the completion of the company's 1 State Lease 1008. Drilled to a total depth of 12,128 ft., the well was completed for 55 bbl. of 22.7°-gravity oil daily through a 3/16-in. choke. Tubing pressure was 350 psi. and the gas-oil ratio, 348 to 1. The rig has been floated 3,000 ft. southwest of the discovery since this picture was made and is now drilling the first offset to the successful well. Location is in Block 24 off Plaquemines Parish, Louisiana.*

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Inspection of Keas' water plant. This operation secures 3,400 bbl. of water per day from six shallow wells. After aeration, chemical treatment, and filtration, it is pumped to injection wells at 800 psig.

Water-Flood Optimism

Oklahoma, Kansas operators visit secondary-recovery projects, see bright future for old, plugged-out leases

Kenneth B. Barnes

CHANUTE, Kans.—The water-flooding business in the Mid-Continent is a bright spot in the oil picture.

This is the consensus of operators, engineers, and water-flood field personnel participating last week in the annual tour of outstanding secondary-recovery projects by the Kansas-Oklahoma Water-Flood Operators Association.

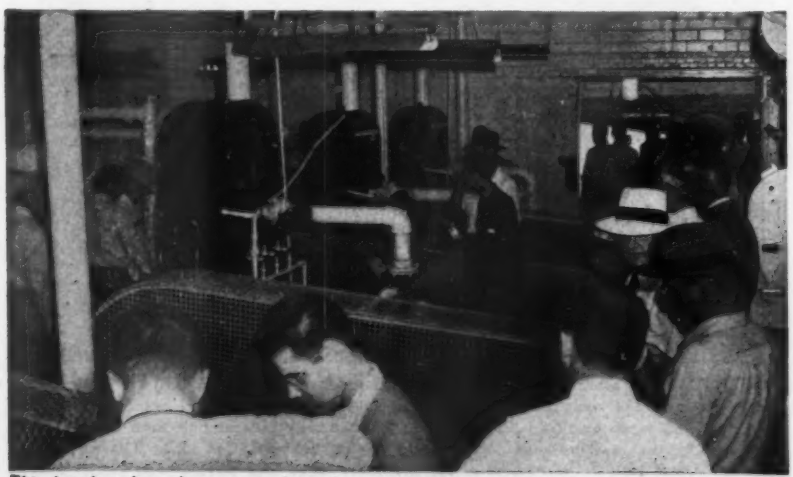
While costs are high, a fair crude-oil price prevails, they say, and unit costs go down as drilling-development activity expands. Additional properties for flooding are being actively sought.

More than 300 persons participated in the inspection tour, conducted this year in Neosho and Allen counties of Kansas in the vicinities of Chanute and Humboldt. The tour was arranged by D. B. Taliaferro, petroleum engineer with the U. S. Bureau of Mines at Bartlesville.

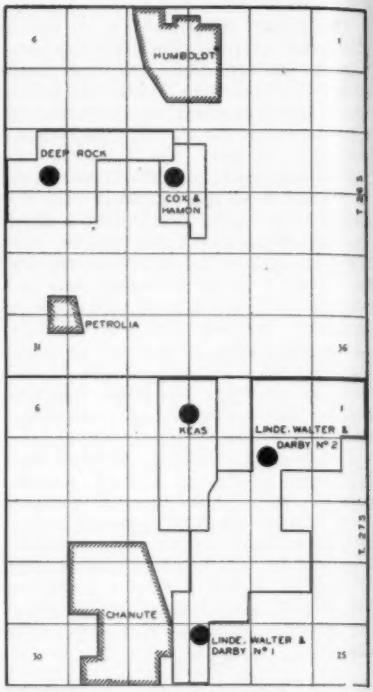
Gossip was rife at the meeting as to new leases being written on old, plugged-out properties for redrilling for water flooding. There has been considerable activity along this line for some time, both in Kansas and Oklahoma.

The four flood projects inspected are located in Humboldt-Chanute field, which contains 15,500 productive acres and produces from the Bartlesville sand at 800 to 900 ft.

Water-flood development, which first started here in 1937, has greatly stimulated this otherwise stripper-well district. Oil originally was discovered in the area a few years previous to 1900, and by 1903 most of the large sand body had been defined.



This interior view shows part of the four electrically-driven, 75-hp. triplex pumps, units and four parallel-connected pressure filters in the Linde, Walter & Darby plant No. 2. Capacity is 11,000 bbl. per day.



Locations of the Kansas water flood projects viewed at operators' meeting. Interest and activity in Mid-Continent secondary-recovery business is now at a high point.

Subsequent production history was similar to that of most of the other shallow fields of eastern Kansas and northeastern Oklahoma. Vacuum operation was rather widely applied, beginning in 1915-1917, and in the period 1925-1935 many compressor plants were built for repressuring the leases with air and gas.

Linde, Walter & Darby.—This project is the oldest systematic water flood in the territory, starting late in 1937. Currently it covers 1,020 acres, and there are 381 active oil wells and 382 water injection wells. Oil production rate for 1949 averaged 905 bbl. daily.

The flood, to the first of the year, has recovered 2,519,000 bbl. of oil through the injection of 31,800,000 bbl. of water, which makes a water injection-oil produced ratio of 12.6. Ultimate recovery estimates indicate the eventual water-flooding yield for some of the tracts in the project will approximate 6,200 bbl. per acre. During 1944-1946 and since, all producing wells were converted from pumping to flowing operation.

Keas Drilling Co.—This operator has 90 oil wells and 68 injection wells, and a present water-flood development of 176 acres. A total of some 1,200 acres are held together. In general, spacing between like wells

ranges between 300 and 400 ft. This operator does not determine the use to which each new well will be put until it has been drilled and the cuttings have been examined. No cores are taken. Most of the old stripper wells are utilized as producers without "workover."

Oil production currently from the Keas project is averaging 350 bbl. daily.

Cox & Hamon.—Particularly from an equipment standpoint, this pilot-type project, which so far has only four water input and four oil wells, rates as one of the most unique operations either at Humboldt-Chanute or anywhere in the Mid-Continent. Water supply (brine) is obtained from the Mississippi limestone at 1,200 ft., through one well. Water is pumped from it through 2½-in. plastic-lined tubing directly to the input wells. The lifting and injection is done by a submerged electrical centrifugal pump (Reda); surface line pressure is 600 psi.

Oil production is lifted by "free type" subsurface hydraulic pumps (Kobe). The lease, which is on a unitized block of 500 acres, is on river bottom lands which sometimes are flooded to a depth of 15 to 20 ft. The pumping is entirely automatic and can be continued indefinitely even if the wells are under water.

Deep Rock Oil Corp.—This operation originally commenced in April 1938 as a 12-acre pilot project of the former owner. There are now 304 acres being water flooded via 119 input and 126 oil wells. All but 19 of the latter are being flowed. From core analysis, the estimated ultimate oil recovery by flooding is 6,950 bbl. per acre for the west side of the project and 3,500 for the east side.

Crude Allowables Raised

Both Oklahoma and Kansas raised their oil allowables for June last week, following similar action by Louisiana and Texas.

Oklahoma's Corporation Commission set the June figure at 453,095 bbl. daily, an increase of 5,467 over May's 447,628. Current production in the state is about 413,000 bbl daily.

In Kansas the Corporation Commission, following Conservation Director T. A. Morgan's recommendation, boosted the June allowable 10,000 bbl. over the May figure to a total of 295,000 bbl. This figure is 50,000 bbl. daily over the state's postwar low of 245,000 bbl. last July.

Earlier Louisiana had raised its allowable to a new record high of 591,135 bbl. daily, an increase of 51,000 bbl. over May.

The Texas Railroad Commission on May 17 added one producing day to the June schedule, providing for an increase of about 140,500 bbl. daily over the May allowable.

INDUSTRY AFFAIRS

Sinclair Steps Down

Historic figure in petroleum industry retires under his company's new pension plan, is named honorary chairman

Dahl M. Duff

ONE of the petroleum industry's most widely known figures, Harry F. Sinclair, is retiring under the pension plan of the organization he founded 34 years ago.

The announcement was made following the recent meeting of the directors of Sinclair Oil Corp. He will continue as a director and also be available as a consultant in the company's affairs.

Sinclair, who will be 74 on July 6, took the first formal step in relinquishing active management of the companies a year and a half ago. At that time he resigned the presidency of the parent Sinclair Oil Corp. and was elected chairman of the board.

In the latest change, Sinclair has stepped down as board chairman. The company directors, in recognition of his achievements in building up the company, conferred on him the title of honorary chairman.

More stories, some fact and some fantasy, have been told about Sinclair's career than probably any other industry official.

Studied pharmacy.—There is only a small element of truth in many Sinclair legends, but they do bear out the fact that he is a man of exceptional energy and endurance with whom a 14 or 16-hour day was not uncommon. This is one factor in his success in building up one of the industry's principal integrated companies with current gross sales of about $600,000,000 a year and assets of $724,000,000.

Sinclair was born in Wheeling, W. Va., July 6, 1876. Six years later, he moved with his family to Independence, Kans., where his father built up the town's leading drug store. Sinclair studied pharmacy at the University of Kansas, but in 1901, after 3 years in the drug business, he moved over into the oil business, first as a lease broker. His first important venture occurred near Kiowa, Okla., where in 1904 an inexpensive participation in a drilling pool netted him about $100,000.

He became an independent producer and began leasing, developing, and trading oil properties. By 1909, when he moved to Tulsa, his original $100,000 from Kiowa had increased to $1,000,000. Sinclair became a leading citizen in Tulsa, and in 1910, when the Farmers National Bank failed, he personally assumed the liabilities and threw the assets into

HARRY F. SINCLAIR

the formation of the Exchange National Bank, which became generally known as "Harry Sinclair's bank."

During his partnership with Pat White, Sinclair gathered together as many producing fields and as much potential production as possible, and when this partnership was dissolved Sinclair was one of the leaders in the Mid-Continent. In 1916, Sinclair put together a number of properties under the title of Sinclair Oil & Refining Co. This integrated operation had 550 wells, 500 miles of pipe lines, four refineries with a daily capacity of 200,000 bbl., and total assets of $4,739,370.

Oil-investment pioneer.—Sinclair then moved to New York. Although the eastern banking world was at that time not in general interested in the petroleum industry, he persuaded the old firm of Kissel, Kinnicutt & Co. to sell for him $16,000,000 of gold notes, among the first bonds or debentures ever marketed in New York for an oil company. He virtually pioneered in the oil-industry investment field and helped dispel much ignorance and secrecy that then surrounded oil operations. By 1920 he was able to sell a bond issue of $50,000,000.

Shortly after the war came the famous Teapot Dome episode. After 5 years of investigation into charges of fraud in development of this Navy reserve, Sinclair was tried for conspiracy and acquitted, but he was

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Middle East Trip

Journal writer to report on current oil operations

PAUL REED, pipe-line editor of The Oil and Gas Journal, is now in the Middle East preparing on-the-spot descriptions of the latest developments in petroleum activities.

His first stop was Dhahran on the Persian Gulf, the operating center in Saudi Arabia. He will visit all operating points on the 30-31-in. line now being laid by Trans-Arabian Pipe Line Co. to connect the oil fields of Saudi Arabia with a terminal at Sidon, Lebanon, on the eastern end of the Mediterranean Sea. This line in many respects is the oil industry's most important transportation project, involving construction problems under desert conditions never before encountered.

Reed also will visit other countries in the Middle East, bringing Journal readers up to date with first-hand information on an area whose importance in world petroleum operations has increased five-fold from its prewar status.

Reed has been a member of the Journal's editorial staff since 1935. Following graduation from Harvard University he was a flier in World War I. He took his basic training in the Southwest, which gave him a desire to work in that section of the country. After release from the service he returned to the Mid-Continent area and engaged in oil production and equipment operations for several years.

Paul Reed (right) on one of his many field trips as the Journal's pipe-line editor. He is shown here with E. H. Frost, pilot for Airplane Pipe Line Patrol Co., following a patrol flight over the systems of Texas Pipe Line Co., Gulf Refining Co., and Texas-New Mexico Pipe Line Co. in the Houston area.

In recent years Reed's main responsibility has been to keep Journal readers advised of the rapidly expanding pipe-line industry. In this work he travels widely and is well known to pipe liners throughout the country. In 1946 he made an extensive visit to South America and wrote a series of articles on engineering and operating developments in several countries.

Reed's articles on the Middle East will begin appearing in the Journal soon.

convicted of contempt of the Senate and contempt of court. Throughout, he maintained his innocence of any intentional wrongdoing, and during the entire period his financial backers and company stood solidly behind him. At the first meeting of the board after his return from the Washington jail, Sinclair was greeted by the entire board with cheers and a rising vote of confidence.

The Sinclair organization steadily continued its expansion over the next quarter century. In May 1930 he bought the assets of Pierce Petroleum Corp., a Standard Oil company prior to the dissolution of 1911. This extended his company's operations further into the Southwest and Middle West as well as into Mexico In August of 1930, he sold Standard Oil Co. (Ind.) an undivided half interest in Sinclair Pipe Line Co. and Sinclair Crude Oil Purchasing Co. for $72,500,000.

In March 1932 he acquired the assets and business of Prairie Pipe Line Co. and Prairie Oil & Gas Co. through a stock exchange for $135,470,000 of Prairie properties, replacing the thousands of miles of pipe line and the crude storage sold to Standard of Indiana. In September of that year, another stock exchange brought the assets and business of Rio Grande Oil Co. whose assets were transferred in 1937 to the newly organized Richfield Oil Corp.

The Richfield company in California had been in receivership for many years. Though various unsuccessful attempts had been made to reorganize the company, Sinclair decided it could be put on its feet. This was accomplished in 1937 when he became board chairman of the reorganized company in which Sinclair Oil Corp. now holds a substantial interest.

Anticipating the second World War, Sinclair disposed of his company's Belgian and German holdings in 1937. He had previously sold properties in France.

What associates say.—Sinclair's associates say that most of the stories about him have been magnified and distorted either by the enthusiasm of friends or by the malevolence of enemies. He is, they say, a man who has always aroused the extreme of loyalty or enmity among those with whom he had more than a passing acquaintance.

His success, in their opinion, is due to the fact that he learned the oil business from the ground up, made mistakes and suffered from them, but at the same time continued steadily ahead on a constructive business program

Rising Demand

No matter how you figure, it's up at least 10 per cent

FIRST-QUARTER domestic demand is up either 10.8, 11.4, or 12 per cent, depending upon which figures you use.

According to data of the Bureau of Mines, domestic demand for petroleum products averaged 6,519,000 bbl. daily during the first quarter. This represents an increase of 10.8 per cent over the same period in 1949 and 8.2 per cent over the corresponding quarter in 1948.

Gasoline demand gaised 7.7 per cent compared with the first 3 months of last year, and fuels increased 13.2 per cent. Fuels for the quarter were boosted by the abnormal heating-oil demand in March.

These figures are for domestic demand as classified by the Bureau of Mines. However, consumption within this country actually increased more than the percentages shown, since military shipments out of the country in the first quarter of this year were less than the same period last year.

Domestic-demand figures, as reported by the bureau, are total demands less commercial exports tabulated by the Department of Commerce. Since these export data do not include military shipments, all military consumption within the country and military shipments out of this country are included as a part of reported domestic demand.

Military exports are now released by the Armed Services Petroleum Purchasing Agency and are reported by the Bureau of Mines as Table 15 in the Monthly Petroleum Statement.

Domestic demand on the bureau basis averaged 6,519,000 bbl. daily in the first quarter of this year, but this included 48,000 bbl. daily of military exports. Thus, net use within the country was 6,471,000 bbl. daily. For the first quarter of last year, domestic demand was 5,882,000 bbl. daily and military exports were 74,000 bbl. daily for a net of 5,808,000 bbl. daily. On this basis, indicated consumption within United States increased 11.4 per cent over the first 3 months of last year.

This net demand figure still in-

cludes sales of distillate and residual fuels for bunkering vessels in foreign trade. The volume of this demand is reported in Table 2 of the same bureau report.

For those who believe that this should not be considered as a part of our net domestic demand, bunkers for vessels in foreign trade decreased 15,000 bbl. daily compared with the first quarter of last year. If both bunkering and military shipments are taken out of the bureau's figures, demand for the quarter increased 12 per cent.

Active Rigs at Year's High

Operating rotary rigs in the United States and western Canada during the week ended May 22 (latest survey) totaled 2,164, the greatest number reported at any time so far this year.

The number was an increase of 53 over that reported at the end of the previous 7-day period, and 35 above the previous high mark of the year during the week ended May 8.

Most notable increase in drilling activity was in the Rocky Mountain area, where 83 rigs were reported running, an increase of 23 over the preceding week. Substantial spurts in drilling also were reflected in the Kansas and Gulf Coast areas.

Although the total number of rigs still was 120 below the high mark of 2,284 attained during the drilling spurt at the close of 1949 (week ended December 12), it was 56 greater than for the corresponding week a year ago. Only once before this year (week ended March 6) has the number of operating rigs been greater than it was for the same corresponding week of 1949.

With the latest increase, the number of active rigs is 216 greater than it was during the week ended February 6, when drilling activity declined to its lowest point this year.

The accompanying table usually appears on the Drilling Contractors page. Trends in drilling activity for the United States and for the Gulf Coast and the Arkansas-North Louisiana and East Texas are shown by graphs on pages 126 and 127.

ROTARY RIGS IN OPERATION*
(United States and Western Canada)

Area—	Week ended 5-22-50	Change week ended 5-15-50	Change week ended 5-23-49
Gulf Coast	498	+16	— 42
W. Tex.-N. M.	724	— 2	+190
Ark.-N. La.-E. Tex.	131	— 9	— 22
Oklahoma	257	— 4	— 4
Kansas	154	+16	+ 36
Illinois-Eastern	135	+ 6	— 6
Rocky Mountains	83	+23	— 25
Pacific Coast	121	+ 1	— 53
Total U. S.	2,103	+47	+ 74
Western Canada	61	+ 6	— 18
Total	2,164	+53	+ 56

*Courtesy Hughes Tool Co.

WEST COAST

Gas-Pipe-Line Study

West Coast engineers discuss construction, maintenance problems at annual P.C.G.A. transmission conference

D. H. Stormont

SANTA MARIA, Calif.—Problems of construction and maintenance of natural-gas lines were given a thorough going-over by West Coast engineers attending the annual transmission conference of the Pacific Coast Gas Association here last week.

Other topics varied from employe evaluation to a discussion of a nomograph for determining the location of line breaks in long transmission lines.

Slack in lines.—A paper of outstanding interest on line construction was that describing El Paso Natural Gas Co.'s method for insuring sufficient slack in the laying of its 30-in. line from the Permian basin to California. It was given by T. B. La Rock, of the company's engineering department.

Admitting that El Paso has been accused of being "slack happy," La Rock said experience has shown numerous girth welds have failed when sufficient slack was not provided.

Thus, on the loop being added to the Texas-California line, he said, slack loops are being placed every 1,000 ft. with tie-in welds being made every 3,000 to 4,000 ft. This practice results in about 12 in. of slack being induced for every mile of pipe line laid. Further discussing the technique, La Rock said:

"In addition to limiting the lowering-in of pipe to temperatures of 70° F. or below, these slack loops induce slack into the line which will compensate for pipe temperatures that will be lower than when the pipe was buried. . . . Should a pipe line be buried at 70° F. without any slack and the pipe temperature should be lowered to 40° F., this difference would induce a longitudinal tensile stress of 6,000 psi.

"This stress would increase by 30 per cent the longitudinal tensile stress of 18,000 psi. due to an internal pressure of 800 psi. on a 30-in. pipe line of 0.335-in. wall thickness. The elimination of this additional stress is the primary purpose of the slack loops."

Reconditioning in place.—How Standard Pacific Gas Line, Inc., recently reconditioned its 20 to 26-in. gas line between Tracy and San Pablo, with the pipe line in place and in service, was described by W. Johnson of that company. The program involved the reconditioning of about 10 miles of pipe, spread over 56 miles of line and involving 30 sections.

The line was excavated with trench hoes to a depth of 18 in. below the bottom of the pipe. Soil under the pipe was then removed with clay spades and spread over the bottom of the ditch, leaving 12 to 14 in. of clearance beneath the pipe.

It was then cleaned, sand blasted, repaired, and rewrapped. Repairs were made with patches, one-third or one-half-circle pipe, depending upon the size required. A box strapping machine was used to secure neoprene rubber plugs over the leaks before the patches or pipe section were welded in place.

In concluding, Johnson said: "The successful completion of this project of reconditioning in place while in service, with a safety record of only two minor injuries and at a cost of less than $3 per foot of completed pipe, places this method on a par with other accepted methods."

Committee report.—W. H. Krammes of Southern California Gas Co., presented a committee report covering standard procedures of work performance on high-pressure lines where personnel is exposed to leaking gas. His committee had been working on the report for the past 2 years. The report covered job site analysis, repairing, and restoration to service with special considerations given to adequate supervision and safety to personnel and the public.

More Antitrust Suits

LOS ANGELES.—The oil industry in other parts of the nation can expect to be targets of antitrust suits of the Department of Justice, Attorney General J. Howard McGrath said here this week.

Terming the West Coast suit against seven major companies "in a sense a test case," McGrath indicated that similar suits in other parts of the country would not be delayed to await the outcome.

William C. Dixon, chief of the Pacific Coast district of the Justice Department, explained that majors on the West Coast have an "integrated industry from the oil well to the buyer" and said there are "comparable situations" in other areas.

(For details of the West Coast antitrust action, see The Oil and Gas Journal, May 18, page 100.)

XUM

Sterling Agreement

British end gasoline rationing, give two American firms more of market; hopes for over-all settlement are raised

Dahl M. Duff and Bertram F. Linz

TEN years of gasoline rationing in England ended last week under a deal whereby American companies will supply a larger share of the market by taking payment in sterling which may be used for the purchase of goods and services in the sterling area.

This came on the heels of the disclosure that Standard-Vacuum Oil Co., which markets in a large part of the Eastern Hemisphere, has renegotiated its sterling agreement with the British Government and that the company is being allowed an increasing amount of usable sterling.

Settlement hopes raised.—These two developments raised considerable hope for a satisfactory settlement of the over-all sterling-dollar oil controversy between American oil companies and the British Government.

Reports from London stated that Philip Noel-Baker, minister of fuels, told the House of Commons that the agreement with the American suppliers ended the long-standing sterling-dollar controversy.

This view was disputed in New York and Washington. Officials of Standard Oil Co. (N. J.) and California-Texas Oil Co., Ltd., made it clear that neither development in itself means that the fundamental sterling-dollar problem has been solved. There still remains the question of displacement of dollar oil resulting from the British substitution policy and bilateral trade agreements with other countries.

However, both the arrangement for ending rationing and Standard-Vacuum's agreement were interpreted as indicating that a reasonable plan for settlement of the broader problem will be offered in the near future. Some industry officials, in fact, spoke of the Standard-Vacuum agreement as possibly becoming a pattern for settlements with other companies.

Washington view.—In Washington the derationing move was seen as a purely political effort by the British Labor Government to strengthen its position.

Such information as was immediately available indicated that a comparatively small amount of gasoline would be involved—500,000 tons or so in England and from 750,000 to 1,000,000 tons a year if rationing is ended throughout the entire sterling area, of which all American companies together would get about 40 per cent. (1,000,000 tons a year is approximately 20,000 bbl. per day.)

Administration officials were withholding comment until reports from the embassy at London were received and studied. They said that Victor Butler, of the British Ministry of Fuel and Power, has been expected for some days to return to Washington for further talks.

They saw nothing in the derationing deal to indicate that the companies' position would be improved by a similar settlement of the basic controversy, but so far, no response has been made to the counter proposals submitted some weeks ago by the State Department, which called for convertibility into dollars of at least that part of the companies' receipts from oil sales which corresponded to the dollar cost of oil produced by the British themselves.

Rationing decision.—The end of gasoline rationing in the United Kingdom was a significant event in itself. Rationing was first imposed in 1939, and in recent weeks it has resulted in strong political attacks against the Labor administration.

In April, with its new budget, the British Government doubled the basic ration to 180 miles a month for private motorists but at the same time doubled the old tax of 9 pence per Imperial gallon. The Conservative opposition made a major issue of this action.

Reports from London said the surprise decision of the Government to end rationing followed acceptance of an offer by Standard Oil Co. (N. J.) to supply all the additional gasoline requirements of its British and United Kingdom affiliates for 100 per cent sterling payment.

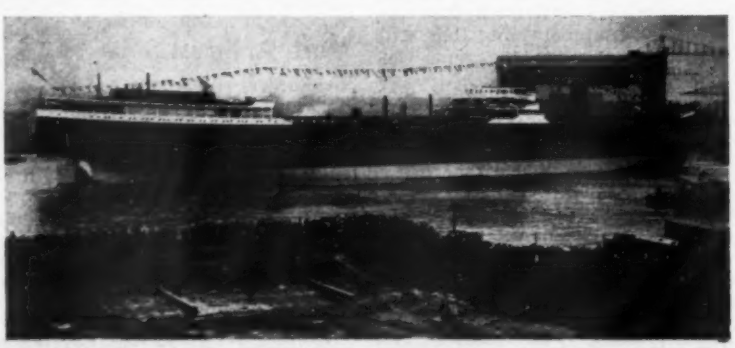
California-Texas Oil Co., Ltd., agreed similarly to take sterling for the additional sales resulting from the increased consumption. The sterling received by these two American companies is to be used to purchase goods and materials within the sterling area for use outside the sterling area.

Rationing has long been a problem for the British Labor Government. After its order last year cutting imports of dollar gasoline by one-third it found that the "surplus" which it said would be used to offset the cut existed only on paper. A deal with the American companies to sell gasoline for sterling appeared to offer a way out of the dilemma.

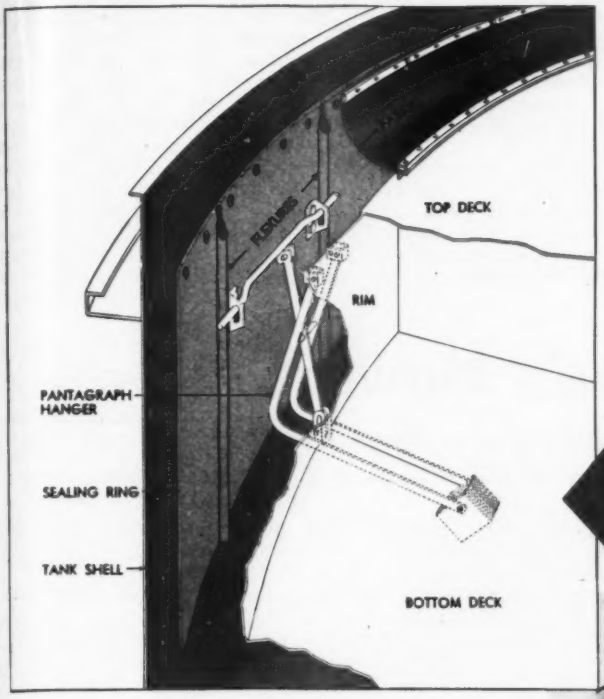
While the companies have not as yet indicated how they will use their sterling, Noel-Baker told Commons it would be spent in building tankers in Britain or on additional services in company operations. In the past, the American companies have not been permitted to sell for sterling because of controls which also prohibited them from spending sterling funds inside or out of the sterling area.

What it means.—Present consumption of motor fuel in the United Kingdom is about 5,000,000 tons a year (about 120,000 bbl. daily). It is estimated that the removal of rationing controls will result in an increase of about 10 per cent, or approximately 12,000 bbl. daily.

Approximately 40 per cent of the



BRITAIN'S BIGGEST.—This tanker, shown here at its recent launching, is the largest yet built in England. It is the Shell organization's new 28,000-ton Velutina, the first of four such vessels which are designed primarily to carry crude from the Middle East to Shell's English refineries. The 643-ft. Velutina with an average speed of 16 knots and a cargo capacity of 26,000 tons will be able to make eight round trips a year to Britain from the Persian Gulf with an annual total of about 1,400,000 bbl. or 14 trips from Mediterranean ports to Britain with approximately 2,500,000 bbl. annually. (Shell photo.)



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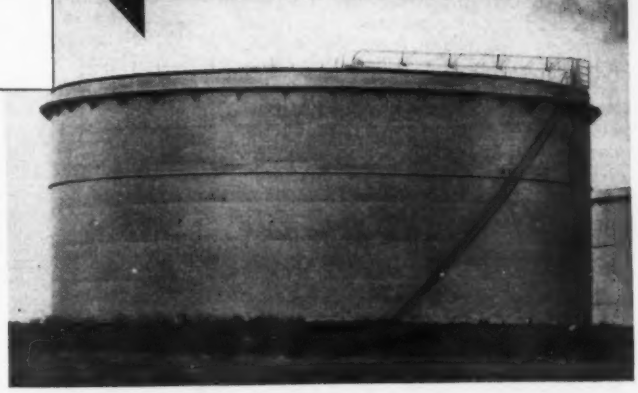

Above: 125-ft. diam. by 56-ft. tank equipped with a Horton Double-Deck Floating Roof at the Texas Pipe Line Company's Midland, Texas station. It is used to store sour crude oil.

The improved Horton Seal closes the space between the deck of a Horton Floating Roof and the shell of the tank on which the roof is installed. It is one of the best devices ever developed for this service because of the combined effectiveness of the following parts:

1. continuous sealing ring—The Horton Sealing Ring provides better protection against vapor losses because it forms a close contact with the inside of the tank. Vertical flexures every 22 inches allow the ring to expand and contract enough to conform to the inside of the tank shell. These flexures also serve as stiffeners to distribute the radial pressure exerted by the pantagraph hangers over the entire height of the sealing ring.

2. pantagraph hangers—These hangers apply an outward pressure at each flexure in the sealing ring. They hold it surely but gently against the tank shell so that it maintains a long sliding contact with the inside of the shell as the roof moves up and down in the tank. The pressure exerted by the hangers is just strong enough to insure good contact—but does not cause excessive wear of the sealing ring.

3. continuous fabric—This gastight, weatherproof flexible fabric closes the space between the top of the sealing ring and the deck of the floating roof. Making the space in the seal gastight is an effective, economical way of keeping evaporation losses low from a relatively small area. The fabric is not affected by contact with petroleum liquids and vapors.

The Horton Seal is now standard construction on the three types of Horton Floating Roofs . . . the Double-Deck Floating Roof, the Pontoon Floating Roof, and the Pan Floating Roof. Improvements like this seal are typical of the benefits you get from dealing with a company that has been building floating roofs for 27 years. Write our nearest office for details.

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Houston, 2....2119 National Standard Bldg.
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XUM

market is held by the American suppliers. Jersey Standard's affiliate, Anglo-American Oil Co., Ltd., meets about 25 per cent and Caltex the remaining 15 per cent. They are to share in the increased consumption in the same proportion.

Several other countries in the sterling area, including India and New Zealand, also continue to ration motor fuel, but it is expected they will follow the British action.

It was pointed out that the American share in this increased market is relatively small in comparison to the 4,000,000 tons a year in dollar motor fuel and fuel oil lost to the American companies as a result of the inauguration in February of the British policy of sterling-dollar substitution.

Company statements. — Standard Oil Co. (N. J.) said the plan evolved in connection with the end of gasoline rationing will cover the period until completion of the new refinery being built at Fawley near Southampton by Anglo-American. After the 110,000-bbl. daily plant goes into operation, using sterling crude from the Middle East, it will produce enough sterling gasoline to supply Anglo-American's requirements without relying on gasoline from dollar sources, the company's announcement said.

Commenting on the plan for sterling sales in connection with the increased consumption resulting from removal of rationing, Caltex said it was an interim arrangement without prejudice to the current negotiations under way for a settlement of the basic problem. While it does not contribute specific progress to the current negotiations, Caltex said it is hoped that the agreement will be the forerunner of a series of developments leading to full settlement of the currency and exchange problem.

No official statement was made regarding the new agreement reached by Standard-Vacuum with the British Government. Company officials in New York confirmed that an arrangement had been worked out and said that any details would be made public in London.

Standard-Vacuum is owned half by Jersey Standard and half by Socony-Vacuum and markets through a wide area of the Eastern Hemisphere east of Suez. Its currency problem has always been considered as different from that of the other American companies—Jersey Standard, Socony-Vacuum, Caltex, and Gulf Oil Corp. This is due to the fact that the Standard-Vacuum markets are almost wholly in such sterling-area countries as Australia and India, with the Philippines and Japan its only significant dollar-sales areas.

The company has had for 2 years or more an arrangement with the British whereby it received a reported 50 per cent of its sterling proceeds in dollars.

Under the new agreement with the British, Standard-Vacuum is reported allowed initially 40 per cent dollars on its sterling-area sales. The agreement takes effect on July 1 and provides that the company will reduce its dollar costs in stages extending over a 2 to 3-year period.

Reports are that the arrangement applies to all sales of the company and not merely to those in excess of the company's proportion of the 9,000,000-ton a year quota of oil imports into the sterling area from dollar sources.

The company is expected to increase its expenditures in sterling and is given broad scope for the use of the earned sterling, though prohibited from using any "trick" devices to work it over into other currencies.

Under these reported terms of the Standard-Vacuum agreement, the British have reduced and will continue to reduce the proportion of dollar-convertible sterling. However, prior to the war, Standard-Vacuum was on a largely sterling-guilder basis due to the location of its markets.

Europe's Newest

Caltex officially opens 20,000-bbl. Pernis refinery near Rotterdam; $18,000,000 plant to process Arabian crude

THE new 20,000-bbl. daily refinery of Caltex Petroleum Mij. (Nederland) N.V., at Pernis, near Rotterdam in the Netherlands was officially opened May 12 by N. R. M. Vandenbrink, Netherlands minister of economic affairs.

The plant, one of the most modern in Europe, was built at a cost of approximately $18,000,000 on 104 acres of built-up land. The Pernis site is 8 miles from Rotterdam on the Niewe Maas River where crude-discharge and products-loading facilities have been provided.

Products to be produced at the refinery consist of motor gasolines, illuminating kerosine, power kerosine, automotive and industrial diesels, and medium and bunker fuel oils. The process installation includes a two-stage atmospheric-vacuum crude distillation unit, thermal cracking and reforming, SO_2 treating, a polymerization plant, small utility rerun unit, and auxiliary sweetening, inhibiting, and ethylizing facilities.

© International Photopress Office, Rotterdam

Atmospheric distillation column in the crude unit.

The operating company is a member of the Caltex-Bahrein group of companies in which ownership is shared equally by Standard Oil Co. of California and The Texas Co. The original decision for construction of the Pernis plant was taken in July 1947, well before the Economic Cooperation Administration came in effect, and although Netherlanders have referred to the project as a "little Marshall plan," no ECA funds were employed.

Initially the plant will employ 500 workers, about 90 per cent of whom are Netherlanders. In a suburban area, 256 houses for employes have been completed, and plans are under way for the construction of a number of large houses for supervisory personnel.

Production from the new refinery will be supplied to economic distribution areas of Holland, Belgium, Luxembourg, and possibly to parts of Germany and Switzerland that can be reached by way of the Rhine River. To provide crude, an ocean-going tanker is scheduled to arrive at Rotterdam every fourth day.

The new refinery represents, in terms of crude intake, an increase of about 60 per cent in the existing refinery capacity of the Netherlands. Also located at Pernis is the country's other refinery, belonging to the Shell Group. This plant at the end of 1949 had a crude-distillation capacity of 33,500 bbl. daily, including 4,500 bbl. daily to the asphalt unit, but was running 55,000 bbl. daily, including crude to cracking and asphalt units.

Dedication speech.—In officially opening the new Caltex refinery, the Netherlands economics-affairs minister pointed out that the Netherlands is now meeting about a third of its petroleum requirements from indigenous production, but said it is likely that refining will continue to

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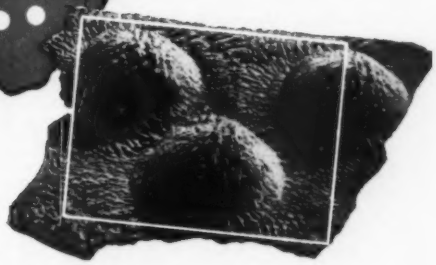

Rectangle in small photo shows area of scale sample in large illustration. "Hills" are scale-covered rivet heads. Approximate size of sample: 7" x 5". *Nalco Laboratory photo.*

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be the predominant feature of the Dutch petroleum industry.

The government official gave assurances that there would be no discrimination against foreign investors in favor of their Dutch colleagues. He said the Dutch Government was convinced of the necessity of foreign investment and had watched with "obvious disappointment and concern" the recent revival of economic nationalism in Europe.

Refinery operating details.—The new Caltex refinery has been designed to process 20,000 bbl. daily of Arabian (Abqaiq) crude. Construction of the refinery on reclaimed land presented a number of problems. Soil conditions required that all major equipment be supported on reinforced concrete piles. The approximately 2,400 piles are 14 in. square and vary from 35 to 100 ft. in length *(see The Oil and Gas Journal, January 13, 1949, page 44)*.

Contractor for the over-all refinery project was Arthur G. McKee & Co., Cleveland.

Distillation unit.—The crude-distillation unit was designed for a crude throughput of 22,500 bbl. per stream day.

The atmospheric and vacuum columns have been designed to separate crude oil into fractions consisting of one whole gasoline cut, one kerosine distillate, one cut each of light, medium, and heavy mechantable diesels, a heavy waxy gas oil, and residuum.

Minimum residuum yield has been established at 9 per cent of crude, a low yield in order to provide a satisfactory supply of heavy waxy gas oil for thermal cracker charge stock and to permit production of low pour-point merchantable fuel oils.

The crude distillation unit is equipped with naphtha rerunning facilities to separate light straightrun naphtha for direct sweetening and blending into motor gasoline. Normally, the rerun column bottoms will be charged to the thermal reformer but provision has been made for producing a heart-cut heavy gasoline for the manufacture of tractor power kerosine.

A stabilizer is provided for debutanization (or depropanization dependent upon finished-gasoline vapor-pressure demands) of the light straightrun naphtha.

Cracking unit.—The thermal cracking unit is a Universal Oil Products Co. two-coil unit designed for 7,500 bbl. daily of 20°-25° A.P.I. gravity heavy waxy gas-oil charge.

The design of the unit provides sufficient flexibility to permit the refinery to meet greater demands for motor gasoline or to absorb higher than the design volume of gas oil into gasoline and fuel-oil products.

A stabilizer is also provided for debutanization of the cracked naphtha for vapor-pressure control and for the recovery of propylene and butylenes for polymerization.

The unit is designed to produce a 400° F. maximum A.S.T.M. end-point motor gasoline and a residuum (cracked tar) suitable for blending into merchantable fuel oil. Provision has been made for varying the depth of cracking over a reasonable range to assist in balancing over-all refinery operations.

Reformer.—The thermal reformer is a U.O.P. design capable of processing 7,000 bbl. of heavy straightrun naphtha. Similar to the thermal cracker, the reformer is overdesigned to meet abnormal short-term gasoline demands.

The reformer is equipped with towers for vapor-phase clay treatment of the reformed naphtha and a stabilizer for vapor-pressure control and the recovery of propylene and butylenes for polymerization.

Normal charge to the thermal reformer will be heavy straightrun naphtha (rerun column bottoms from the crude unit) of approximately 35 C.F.R.M. clear octane. The design of the unit incorporates adequate flexibility in reforming severity to permit variation of the product octane number over a reasonably wide range up to approximately 70 C.F.R.M. clear octane. The small yield of reformer tar will be disposed of in fuel-oil blending.

Polymerization.—A polymerization plant employing liquid phosphoric acid as a catalyst has been provided to convert propylene and butylenes from the thermal cracking and reforming units to motor-gasoline polymers. The unit has been sized to handle the maximum combined olefin production from capacity operations of the thermal cracker and reformer.

Auxiliary feed-preparation facilities have been included for deethanization and hydrogen sulfide and mercaptan removal of the polymerization plant olefin feed. Deethanization is required to prevent the formation of a stable ester, produced by the action of phosphoric acid on ethylene, which inactivates the catalyst.

Stabilization of the reactor effluent is accomplished in two steps—depropanization followed by debutanization. The depropanizer overhead provides "sweet" propane gas for the refinery fuel-gas system; the debutanizer overhead provides "sweet" butane for vapor-pressure control of motor gasoline.

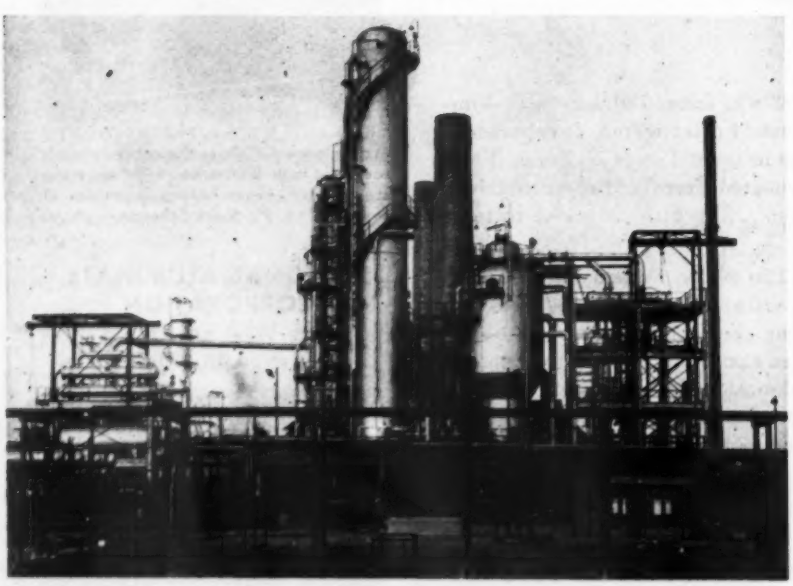
SO_2 treating.—An SO_2 treating plant of the Edeleanu type has been provided for the removal of aromatics and sulfur from kerosine distillate in order to produce high-quality illuminating kerosine. It is anticipated that this illuminating kerosine will also meet British jet-fuel specifications.

Excess capacity has been incorporated in the SO_2 treating plant to give the refinery a reasonably high degree of flexibility in kerosine or jet-fuel manufacture.

The SO_2 treating-plant extract, relatively high in octane rating due to its aromatic content, will be rerun and used in power-kerosine manufacture. Lines have been provided so that any excess extract may be rerun for motor gasoline or routed to fuel-oil cutter stock.

Rerun unit.—In order to rerun SO_2 treating plant extract and raw polymers, a utility rerun unit has been included. This rerun unit will handle both stocks on blocked operation.

Sweetening plants.—The Caltex Holland refinery is equipped with three



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Crude distillation unit, atmospheric tower and vacuum towers in the Pernis refinery.

continuous lead-sulfide sweetening plants having the following capacities: light straightrun-reformed naphtha, 7,000 bbl. per stream day; cracked naphtha, 4,000 bbl.; and illuminating and power kerosine, 2,050 bbl.

The gasoline-sweetening plants have been sized to sweeten the normally straightrun naphtha from the crude-distillation unit plus all of the naphtha which can be produced from the thermal cracker and reformer at maximum capacity. Similarly the kerosine-sweetening plant has been sized to sweeten the anticipated maximum production of kerosine or power kerosine.

Inhibiting and ethylizing facilities.—Inhibiting and ethylizing facilities have been provided for 11,000 bbl. daily of motor gasoline, this being the combined capacities of the two motor-gasoline sweetening plants.

Britain on Schedule

Current refinery-construction program indicates Britain will have 400,000-bbl. daily throughput by end of 1952

THE British refinery construction program, designed to give the United Kingdom a total throughput capacity of about 400,000 bbl. daily by the end of 1952, is generally on or ahead of schedule.

Fawley.—Information was given the House of Commons in London that the Fawley project should be in operation before the end of 1951, a year ahead of original estimated completion date. This 110,000-bbl.-daily refinery, being built by Anglo-American Oil Co., Ltd. (Jersey Standard) will be the largest in Europe.

The first major step in construction of the Fawley refinery proper was taken recently when foundations for the fluid catalytic cracking unit were laid. This involved the pouring of more than 30,000 cu. ft. of concrete in a single day. The area filled in with concrete covers some 5,000 sq. ft.

Two 60-ft. square pontoons arrived at Southampton from Holland for use in driving 20-ton piles for the approach jetty and tanker berths at the new Fawley refinery. The approach jetty at Fawley will be 2,000 ft. long, and the total length of the pierhead and four tanker berths will be 3,000 ft.

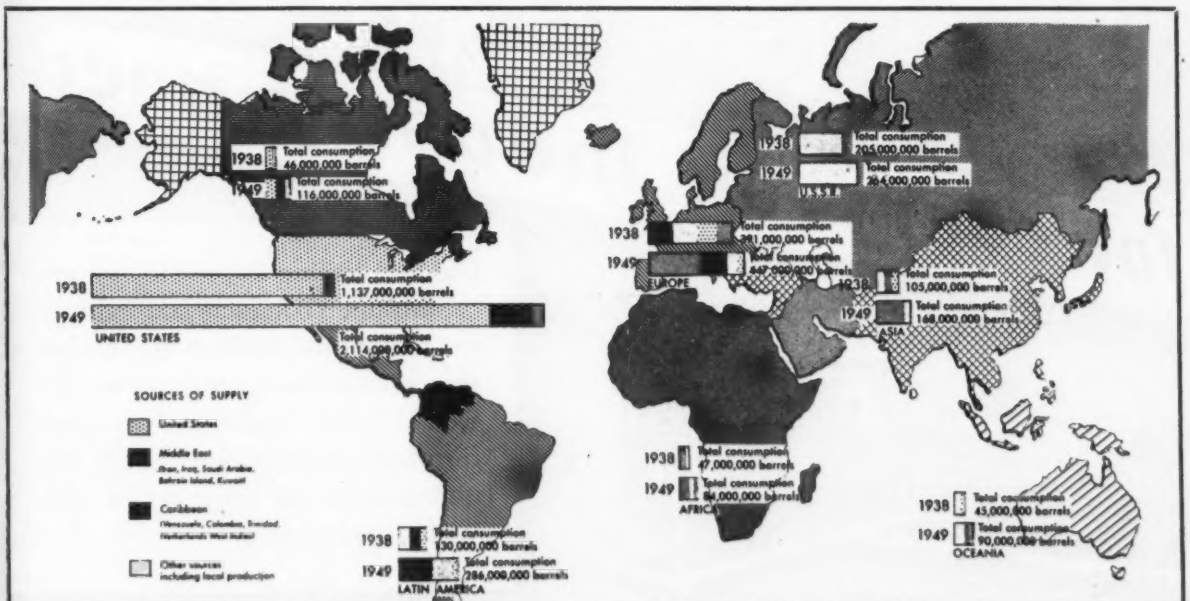
Shellhaven. — Shell officials in London said that work on the new Shellhaven refinery on the Thames Estuary was going ahead according to plan. Initial operations are to get under way in November, and expansion work at this plant is to make it ultimately Europe's most complete.

The program at Shellhaven was curtailed a year ago, officials in London said, to reduce planned capacity from 3,500,000 tons a year to 2,400,000 tons a year. Along with general concern over possibility of overproduction of European refining capacity, it was said there were doubts whether the heavy cost of catalytic cracking at Shellhaven would be commercially justified.

The layout at Shellhaven provides for installation of catalytic cracking later if warranted. The reforming unit of 1,200 tons daily capacity is due to be in full operation by May 1951, and officials said this could do much the same work at lower capital cost, consideraing the types of products which are allowed to be sold in the United Kingdom at present.

The Shellhaven plant is to operate on Middle East crude from Kuwait, which was named as a sterling crude source. The entire British refinery program is aimed at providing processing capacity for sterling crude to meet sterling-area requirements. Its completion will allow dollar oil, including Shell's own dollar production in dollar areas, to be sold in dollar markets, according to the London reports. Other projects in the British refinery expansion are being carried out principally by Anglo-Iranian Oil Co., Ltd., and the Socony-Vacuum-Powell Duffryn interests.

Shell announced that the installa-



***SHIFT IN DISTRIBUTION.**—Most significant change in the postwar pattern of world oil distribution has been the increasing supply of Europe and other parts of the Eastern Hemisphere out of the Middle East. The Caribbean continues to meet a sizable part of the European requirements but this is expected to decline substantially with the completion of new refining capacity in western Europe. Russia continues as a self-contained oil area of no major importance in the world petroleum trade. This map, reflecting in general a decline in exports of oil from the United States, was prepared by Standard Oil Co. (N. J.) as a part of its statement on oil imports to the House subcommittee investigating the question. (See National Affairs.) Figures show estimated world consumption of petroleum and sources of supply, a comparison of 1938 and 1949.*

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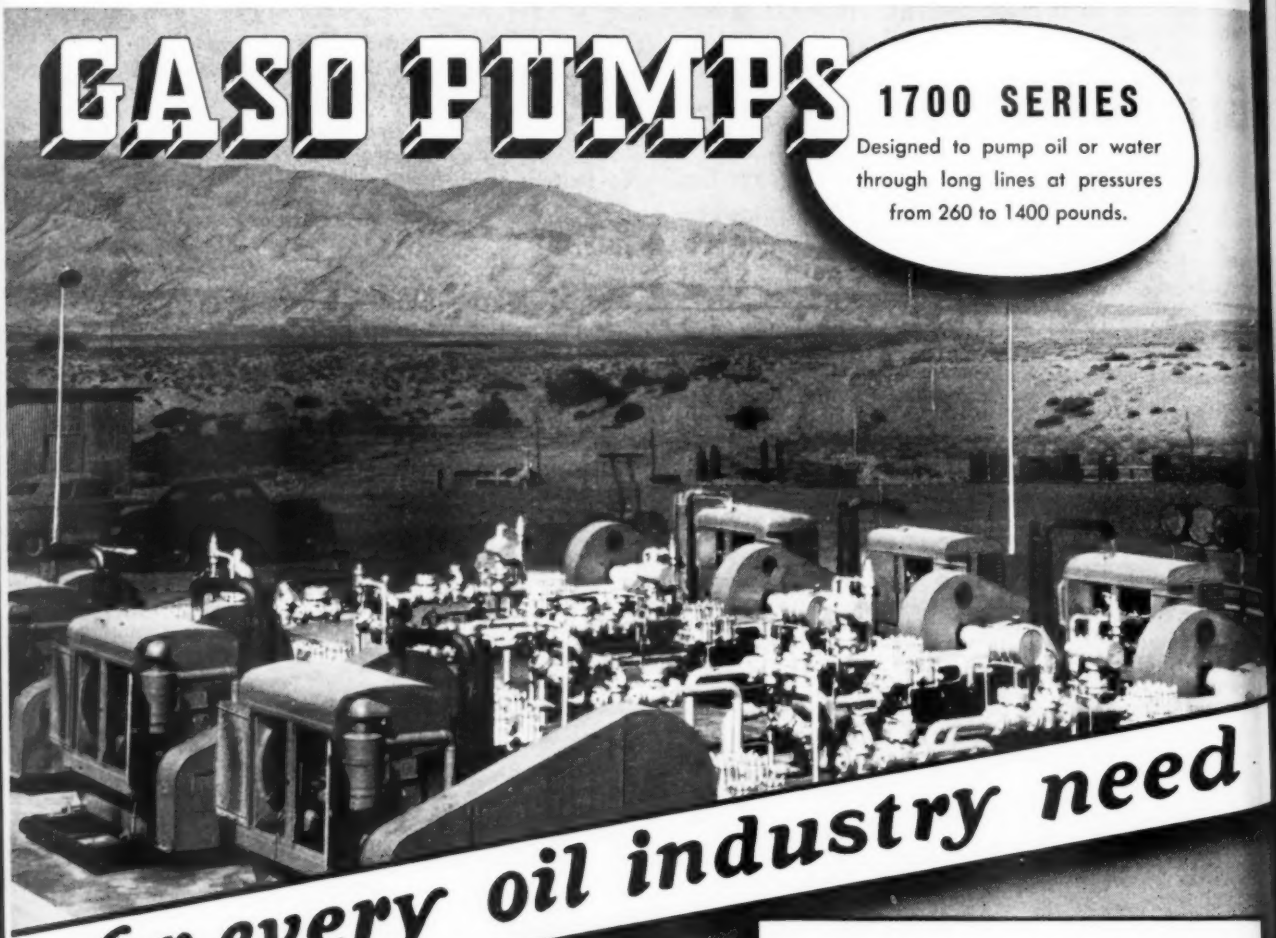

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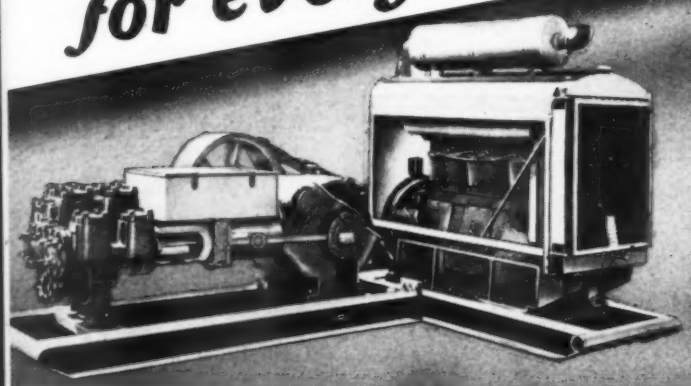

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tion of a reforming unit, at Stanlow, Cheshire, the second stage of the construction program at this plant, has been completed 6 weeks ahead of schedule. The first distillation unit comprising the initial stage of this work went on stream last November. It has a capacity of about 20,000 bbl. daily. Another distillation unit and auxiliary equipment is under construction.

The full refinery at Stanlow is expected to be in operation in 1952. With the other plant at Shellhaven, Essex, total capacity will be about 100,000 bbl. daily.

Tynemouth.—One contemplated project in the British program has been indefinitely postponed. This was for a refinery to be built at Tynemouth by Trent Oil Products at a cost equivalent to about $8,400,000. Some capital expenditures in Britain are being restricted, and a Ministry of Fuel and Power official said there was no chance of the Tynemouth project starting this year or in 1951.

LATIN AMERICA

New Pipe Line

Colombia plans 112-mile products line into Bogota

THE Colombian Government is taking steps to end the dependence of its capital, Bogota, on railroad shipments of petroleum products.

Reports last week were that a contract has been negotiated by the Department of Cundinamarca with Williams Brothers for the construction of a 112-mile products pipe line from the east bank Magdalena River port of Salgar.

The contract is scheduled to be finalized in the near future. Size of the line is to be probably 6 or 8 in. Estimated cost of the project has been placed at Ps 6,000,000 ($3,000,000).

About 40 per cent of the load of the existing rail line now consists of petroleum products. Interruptions in this system in recent months have interfered with gasoline supply in the capital, and private automobiles have been rationed to 4 gal. daily.

The Salgar-Bogota pipe line will traverse some difficult mountain terrain, rising to about 7,000 ft. after leaving the river. It will be another link in the projected Colombian products pipe-line transportation system which now consists of one 69-mile, 6-in. line from the Tropical Oil Co. refinery at Barranca Bermeja to Cantimplora near Puerto Berrio.

Initially products will be supplied to the Salgar end of the Bogota line by river barge. A line for the gap extending upriver from Cantimplora to La Dorada, across the river from Salgar, is being studied. In addition, plans are under way for the construction of a line from Puerto Berrio westward to serve the Colombian manufacturing center at Medellin. This is another city now supplied by relatively high-cost rail transportation.

Trinidad Discovery

Oil and gas show raises hope for north of island

FIRST discovery of oil in the northern half of Trinidad in an exploratory well of United British Oilfields of Trinidad, Ltd., has been reported from Port of Spain.

An official statement of the company issued in Port of Spain, however, said that prospects of the well becoming a commercial producer are not at present encouraging. It said oil and gas were found in small quantities and that the well is being tested. Depth was said to be 5,000 ft.

The original reports from the British West Indies island asserted that the discovery had disproved the long-held belief that production was possible only in the southern part where the existing fields are located. It was said that more gas than oil was indicated.

The northern part of the island is metamorphosed, and some geologists feel gas is more likely in quantity in this area than oil. Exploratory drilling to maintain and extend the island's reserves since the war has been a goal of the Trinidad companies, which are almost wholly British.

The United British Oilfields' well is near Manzanilla Beach, which is in the central part of the eastern side of the island at the north edge of Cocos Bay. Trinidad Northern Areas, Ltd., is reported to be drilling a deep test in the same general area. This company is backed by Trinidad Leaseholds, Ltd., United British Oilfield, and D'Arcy Exploration Co., Ltd.

Mexican Loan Still Alive?

WASHINGTON. — President Truman refused last week to be drawn into a discussion of an oil loan to Mexico. Reportedly, the matter is now under consideration at the White House where, it is rumored, action may be taken in the near future.

Asked at his weekly press conference whether any progress has been made toward negotiating a loan, the President returned a "no comment" answer, which blocked further efforts to ascertain what, if anything, has been done.

Efforts to reach a satisfactory basis on which the United States could advance money to Mexico for development of production, refining, and transportation facilities were dropped last July after several months of discussions in Washington.

AFRICA

French Firms Get Grants

WASHINGTON. — The Economic Cooperation Administration announced last week that it was contributing $1,300,000 of European Recovery Program funds toward a $15,000,000 development project of two French oil companies in French North Africa.

The allocation will give $220,000 for maintenance and replacement of machinery and $500,000 for additional drilling equipment to S. N. Repal, which operates in Algeria, and $500,000 for maintenance and replacement equipment to S.C.P., which operates in Morocco.

The ECA said that exploration has disclosed that seven-ninths of Algeria's territory is underlaid by potential oil-bearing strata and that oil already is being produced in commercial quantities in Morocco. The two companies plan extensive prospecting and drilling in those areas.

Drilling in Africa

As a part of the over-all French oil exploration program, drilling operations are now being carried out in French Equatorial Africa by Soc. des Petroles de l'Afrique Equitoriale Francaise.

The company was founded in July 1949 at Port Gentil and holds an exploration permit for the whole of French Equatorial Africa. Shareholders include Syndicat d'Etudes et de Recherches Petrolieres (predecessor of Soc. des Petroles d'A.E.F.) and Cie Francaise des Petroles.

This year's drilling is centering in the region north of Ogooue along the coast.

In the French Island of Madagascar, a new company, Soc. des Petroles de Madagascar, has been formed. Reports are that it hopes to commence operations on the island in about 18 months following arrival of the necessary equipment which has been ordered.

AUSTRALIA

Deep Test Spudded

Shell (Queensland) Development Pty., Ltd., has spudded in its projected deep test at Morella, 100 miles south of the Springsure railhead.

E. N. Avery, general manager of Shell Co. of Australia, Ltd., said the rig in use will permit drilling to 10,000 ft. if conditions warrant it.

Shell began its search for oil in Queensland in 1940. Work was halted by the war in 1943 but was begun again in 1946. Site for the present deep test was selected last September.

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New Gulf Vice Presidents

Ben C. Belt, P. H. Bohart, and F. J. Adams named to new posts by directors

THE board of directors of Gulf Oil Corp., Pittsburgh, has elected three veteran production men to the posts of vice president. They are Ben C. Belt, Houston; P. H. Bohart, Tulsa; and F. J. Adams, Fort Worth.

Belt joined Mexican Gulf Oil Co. in 1916, serving in Mexico and Cuba. He was made chief Gulf geologist of Fort Worth district in 1917, and became assistant to the chief geologist, Houston division, after a short period of service with Pantepec Petroleum Co., Tampico, Mexico. Rejoining the company, he served in Fort Worth as chief geologist there from 1925 to 1929. Belt was transferred to Houston as chief geologist of that division in 1929 and held that position until 1933, when he was promoted to assistant to the vice president, which position he has held until his present appointment. He is a graduate of the University of Oklahoma.

Bohart joined the Gulf organization in 1919 as a field geologist in the Texas Panhandle. He served in Mexico as a geologist for Mexican Gulf Oil Co. in 1920, was appointed assistant general agent of Mexican Gulf in 1926, and in 1929 was named general agent of activities in Mexico. He transferred to Tulsa in 1934 as vice president of Gypsy Oil Co. and Gulf Pipe Line Co. of Oklahoma and in 1936 was made assistant to the vice president of Gulf Oil Corp.

Adams has been with the company for nearly 40 years, joining the firm as a clerk at Beaumont, Tex., in 1910. He served also in Shreveport and in 1918, following service in World War I, was transferred to Fort Worth. He was named general agent in 1924 and held that position until his election as vice president. He is also director of Devonian Oil Co. and a member of its executive committee.

Dan Patrick, geologist for Atlantic Refining Co. at Jackson, Miss., has been transferred to Tulsa as assistant district geologist.

Jack Alan Prather, foreman for Sun Oil Co. at Snyder, Tex., has been transferred to Denver. His transfer was on a loan basis but his stay is termed indefinite.

G. Stewart Taitt, first assistant general manager of Shell de Colombia, is scheduled to leave Colombia in the near future for a new assignment with the Shell Group in Cairo. **J. van Hellemond,** civil engineer, and **L. Walpole,** geologist, have been transferred from Shell's Colombian operations to Venezuela, and **R. Martin,** subsurface engineer with Shell in Colombia, has been transferred to Indonesia.

C. H. Dresbach, formerly head of Gulf Oil Corp.'s operations in Colombia, has been given an assignment with the company in Tunisia where it is commencing a new exploration program.

Gus Obenhaus, petroleum engineer, Stanolind Oil & Gas Co., Houston, has been transferred to Corpus Christi in the same capacity.

Virgil Spradlin, geologist with Pure Oil Co. at Tulsa, has been transferred to newly established offices in Wichita as district geologist.

C. Desmond Pengelley, Columbus, Ohio, has been appointed chairman of engineering mechanics for Southwest Research Institute, San Antonio. He formerly was with Curtiss-Wright Corp.

D. B. Wise has been elected secretary of American Republics Corp., Houston, succeeding the late E. G. Floeter, and **G. L. Townsan** has been elected to the newly created position of controller. **Flavy E. Davis,** formerly with Gulf Oil Corp. and Sinclair Refining Co., has joined the company as regional assistant to **A. K. Tyson,** vice president.

Hy Byrd, director, vice president, and treasurer of Panhandle Eastern Pipe Line Co., has been elected president of Trunkline Gas Supply Co., subsidiary of Panhandle Eastern, which is constructing a natural-gas line from Texas to Illinois. **Leslie T. Fournier,** a vice president of Panhandle Eastern, was elected to the additional office of treasurer to succeed Byrd, who will continue as a board member of Panhandle Eastern.

Sam Parks, formerly with Atlantic Refining Co.'s producing department at Houston, recently resigned and has gone to Canada, where he will be associated with Catawba Oil Co., Calgary, Alta.

Dr. Kumiji Iida, chief of the geophysical department of the Geological Survey of Japan, is touring the United States studying geophysical prospect-

RECEIVES AWARD.—Brig. Gen. Richard J. O'Keefe congratulates Floyd W. Ohliger, vice president of Arabian American Oil Co., after presenting him with the Exceptional Civilian Service Award at Dhahran, Saudi Arabia. Gen. O'Keefe is commander of the American air base at Dhahran. The award was made in recognition of Ohliger's distinguished patriotic service from 1942 to 1949.

ing equipment developed in the United States since the war. He has visited New York, Washington, Pittsburgh, and Tulsa, and will return to Japan next month after visits to Dallas, Houston, Denver, and Los Angeles.

Mills Cox, B. D. Goodrich, C. L. Brockschmidt, Walter E. Caine, and

B. D. GOODRICH

MILLS COX

O. S. Carpenter, all of Texas Eastern Transmission Corp., New York City, have been named vice presidents of the company. Cox will serve as vice president in charge of gas supply, and Goodrich will serve as vice president and chief engineer. Brockschmidt will be in charge of gas sales; Caine will be vice president and treasurer; and Carpenter will serve as vice president and controller. Cox joined the firm in 1948, and formerly was with Penrod Drilling Co., Shreveport. Goodrich has been with the company since 1947, and formerly was engineer for United Gas Pipe Line Co. Brockschmidt joined the company in 1947, coming from Standard Oil Co. (N. J.) where he was a specialist in liquefied petroleum gas. Caine joined Texas Eastern in 1948, and formerly was with American Gas Association. Carpenter came with the company in 1947 and formerly served as a certified public accountant in Austin.

K. H. Crandall has been elected a vice president of Standard Oil Co. of California. Since 1947 he has been vice chairman of the board of the California Co., a producing and marketing subsidiary of California Standard operating in the Rocky Mountains and central and Gulf Coast areas. He has been a director of Standard Oil Co. of Texas, another subsidiary, since 1948. Crandall joined California Standard in 1925 as assistant geologist and later was placed in charge of all geophysical work for the company and Standard of Texas. He became a director and vice president of the California Co. in 1942 and president in 1945. Crandall is a graduate of Stanford University.

R. P. Lennart, former executive assistant to **J. R. Polston,** general manager of Service Pipe Line Co., Tulsa,

R. P. LENNART

E. E. HURLEY

has been named head of the newly created oil-movements department, with the title of supervisor of oil movements. Other appointments in the department include: **E. E. Hurley,** planning engineer on the staff of **T. R. Aude,** director in charge of planning and economics, named to Lennart's former post; **S. N. Williams,** former oil-accounting section head, named assistant supervisor; and **J. D. Behling,** oil-traffic engineer in the office of **Ray Harvey,** chief dispatcher, named oil-movements engineer. The department will be responsible for coordination of oil movements and will also function as a management liaison agency on oil-movement problems.

C. D. Redmond, formerly with Tropical Oil Co. in Colombia, has been

***SHELL PRODUCTION MEETING.**—Above are Shell Oil Co. production men and several visitors who attended recent meetings at the company's Los Angeles headquarters under direction of E. W. Masters, manager of the Pacific Coast production department. Left to right: A. J. Johnson, vice president, Shell Development Co., San Francisco; P. B. M. Linton, production manager, Egypt; C. P. Bristol, production manager, Houston area; R. Naber, production manager, Indonesia; F. J. Toth, superintendent, San Joaquin division, Pacific Coast region; Masters; J. M. MacQuarrie, production assistant to vice president, New York; M. C. Bruner, production manager, Midland, Tex., area; E. N. Van Duzee, production manager, New Orleans area; W. H. Burke, production manager, Tulsa area; H. Gershinowitz, director, exploration and production research laboratory, Houston; George Burpee, production manager, Calgary, Alta., Canada area; R. W. Bond, director of production, east of Rocky Mountains; R. R. Robison, superintendent, coastal division, Pacific Coast region; J. P. Murphy, assistant director, exploration and production research laboratory, Houston.*

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PERSONALS

LOS ANGELES NOMADS VISITORS.—Above are foreign visitors at the May meeting of the Los Angeles Chapter of Nomads. Front row, left to right: P. H. Molidore, Standard Oil Co. (N. J.), Barranquilla, Colombia; H. M. Heath, Colombian Petroleum Co., Colombia; H. W. O. deBruijn, N. V. de Bataafsche Petroleum Maatschappij, The Hague; P. M. Bowen, Shell Oil Co.; and Robey Deem, Shell Oil Co. of Colombia, Barranca Bermeja, Colombia. Back row, left to right: R. D. Widney and Harry E. Alger Widney Drilling & Servicing Corp., Ltd., Calgary, Alta., Canada; J. F. Roberts, Iraq Petroleum Co.; W. A. Duncan, Burmah Oil Co., Ltd.; Orin G. Sease, The Texas Co., Colombia; H. G. Karnes, I. P. P. Exploration Co., Tripoli, Lebanon; Roberto Avila, Socony-Vacuum Oil Co. of Colombia; E. N. Archibald, Socony-Vacuum Oil Co. of Venezuela; and E. W. Conn, Los Angeles, and A. C. Swanson, Alhambra, Calif., both with Johnston International.

made a senior paleontologist with Arabian American Oil Co. at Dhahran, Saudi Arabia.

Luther B. Smith, geologist at Shreveport for Arkansas - Louisiana Gas Co., has been transferred to Wichita Falls, Tex., as division geologist in charge of the land, geological, and scouting departments.

Ira P. Robinson, formerly with Interstate Natural Gas Co. at Monroe, La., has been named superintendent of dispatching for Texas Gas Transmission Corp. with headquarters at Owensboro, Ky. **Thomas E. Bates,** formerly in the land and lease department, has been appointed division supervisor of surveys in the engineering department.

Willard E. Sanger, Pure Oil Co., has been elected president of the Michigan Geological Society. Other officers include: **Kenneth A. Vravella,** Gulf Refining Co., vice president; **Erwin Stumm,** geological professor, University of Michigan, secretary-treasurer; and **John Rulison,** Michigan's Department of Conservation, business manager.

P. W. THIRTLE

P. W. Thirtle, controller and a director of Sinclair Oil Corp., has been elected a vice president of the company. He has been succeeded as controller by **H. Jeffries,** formerly assistant controller. **S. H. McManus** was named to the position of assistant controller. Thirtle has been general auditor and controller of the parent Sinclair company since its founding in 1916. He was elected a director of Sinclair Oil Corp. in January, succeeding **Alvin Untermyer,** who resigned.

SHIFTS

F. L. Peavy, producer, Peavy Oil & Gas Co., Naphs, Fla., to Marietta, Ohio; **Ralph W. Johnson,** engineer, M. W. Kellogg Co., Brooklyn to Valley Stream, N. Y.; **Elmer O. Mattocks,** engineer, Phillips Petroleum Co., Bartlesville, Okla., to Rockaway Point, N. Y.; **Edward A. Meyer,** Continental Oil Co., Edmond to Wilson, Okla.

DEATHS

Dave Caplan, 63, Dallas oil operator and vice president of Spandsco Oil & Royalty Co., died May 24.

Jones Fuller, 70, Overton, Tex., owner of oil properties in East Texas and the Texas Panhandle, died May 13.

John L. McMahon, 74, pioneer oil man, died in Wichita Falls, Tex., May 24. He formerly was general superintendent of The Texas Co.'s North and West Texas Division until retirement 10 years ago.

Olin W. Jones, 68, retired oil man, died in Tulsa May 22.

W. E. L. K. Andrau, 81, retired member of the board of directors of Royal Dutch-Shell and father of E. W. K. Andrau, Houston geologist and oil man, died at his home in The Hague, the Netherlands, May 19.

William C. Jackson, 45, Tulsa, independent oil contractor, died May 25.

Norman F. Paxton, assistant secretary and assistant controller of Panhandle Eastern Pipe Line Co., Kansas City, Mo., died recently. He joined the company in 1930.

Lawrence W. Weismantel, 48, formerly plant superintendent for Cities Service Oil Co., died May 25 in Cranford, N. J.

Kenneth G. Walsworth, 34, petroleum geologist with the Michigan Department of Conservation, Lansing, died in Ann Arbor, Mich., May 24.

Howard E. Davis, drilling contractor, died in Oklahoma City May 13.

Frank B. Killian, 67, retired chief automotive engineer in the foreign-trade department of Socony-Vacuum Oil Co., Inc., died May 20 in Bellport, L. I.

Williard W. Smith, 73, former chairman of the lubricating-oil committee of Socony-Vacuum Oil Co., Inc., died May 17 at Plandome, N. Y.

George Messer, 92, pioneer oil operator and wildcatter in southwestern New York, died May 21 at Knapp Creek, N. Y.

C. M. McNutt, with McNutt Oil & Refining Co., Lomita, Calif., died recently.

Ralph M. Smith, Calgary, Alta., Canada, president of General Petroleums, Ltd., and a director of Superior Oils, Ltd., died May 26.

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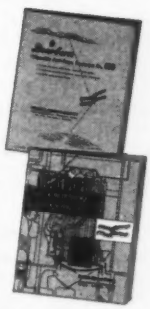

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USE OF TUBING AS DRILL PIPE

by W. F. Bates

W. F. Bates is drilling engineer for Shell Oil Co., Los Angeles. He received A.B. from Stanford University in 1934, started working with Shell immediately after graduation. Bates has completed various engineering assignments at Long Beach, Ventura, and Bakersfield, for the last 5½ years has been located in Shell's Los Angeles office, working exclusively with drilling problems. Presented at spring meeting of A.P.I. Production Division, Los Angeles, May 11-12.

AS an integral part of the continuous effort to reduce well costs, the Pacific Coast area staff of Shell Oil Co. undertook a study of slim-hole drilling. These studies were conducted to determine optimum hole and drill-pipe sizes and included such factors as circulating rates and pressures, mud flush, rising velocity, and availability of suitable side-wall sampling, fishing, and testing tools. Because theoretical and practical considerations were strongly in favor of the 6¾-in. hole using 3½-in. drill tubes, this combination was accepted as a basis for slim-hole operation.

Studies of possible drilling units that could be moved legally over California highways led to the conclusion that equipment designed to handle 10,000 ft. of 3½-in. drill pipe did not exist and furthermore that it was extremely unlikely such equipment could or would be built for some time; however, it was recognized that existing portable equipment could be used to drill deeper if the drill-pipe loads could be reduced. Further studies along this line, which included a review of our experience with Acme-thread drill casing used for drilling in Ten Section field, California, led to the selection of 9.3-lb., 3½-in. upset J-55 A.P.I. tubing with Acme-type threads for the drilling of 6¾-in. slim holes.

A portable drilling unit powered with a 150-hp. diesel engine was available for testing the practicability of using tubing for drilling and it was reasoned that as this unit could successfully handle loads equivalent to 3,500 ft. of 4-in., 16.6-lb. drill pipe, its depth range could be extended to 6,500 ft. through use of 9.3-lb. tubing as drill pipe.

Selection of 9.3-lb. tubing was based primarily upon availability of an A.P.I. standard tube plus the fact that 2½-in. tubing had been successfully used in drilling-in operations in Ten Section field. Therefore, it was believed this tubing would have the ability to transmit the necessary torque required for rock bit drilling. "J" grade tubing was preferred over "N" grade as it has more resistance to shock as indicated by elongation specifications.

Thread Selection

Acme-type threads were selected because they had been used successfully in our drill-casing operations in Ten Section field and also because this type of thread could be obtained without waiting for the manufacture of special joints. Also, it was believed that an inexpensive tool joint such as a tubing collar, if it could be used, would contribute materially to the economic success of slim-hole drilling. As experience with drill casing had definitely proved (1) the desirability of using power tubing tongs to spin up the pipe as it is run in the hole, and (2) the necessity of using specially built tong jaws which would evenly distribute over a large area the crushing force developed while breaking out the tubing, this equipment was obtained before starting the drilling test.

As circulating rates and pressures were expected to be well within the rating of the pumps normally used with the 150-hp. drilling unit, no alterations or additions were made to this equipment.

Area "A" in the San Joaquin Valley was the location for our initial tubing-drilled hole. A conventional well had been drilled in this area in 1945 which it was believed would offer a yardstick for comparing progress. The tubing-drilled hole was completed in 1946. A detailed cost comparison indicated that when allowances were made for the estimated rise in material and labor costs, the saving was about $2 per foot, or about 30 per cent.

In addition to this favorable cost comparison, a study of other factors such as round-trip time (Fig. 1), time on bottom (Fig. 2), total time minus time on bottom (Fig. 3), drilling rates and bit records (Fig. 4) as well as a comparison of various percentages of total time (Fig. 5) indicated that the slim hole and lightweight pipe combination was comparable to the large

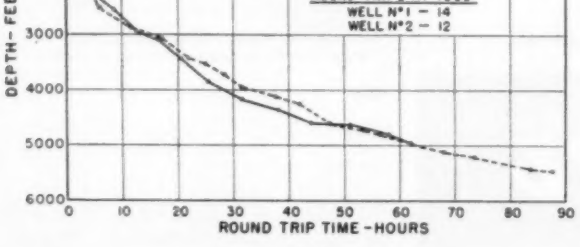


Fig. 1

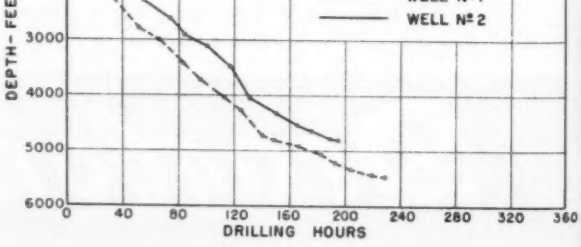


Fig. 2

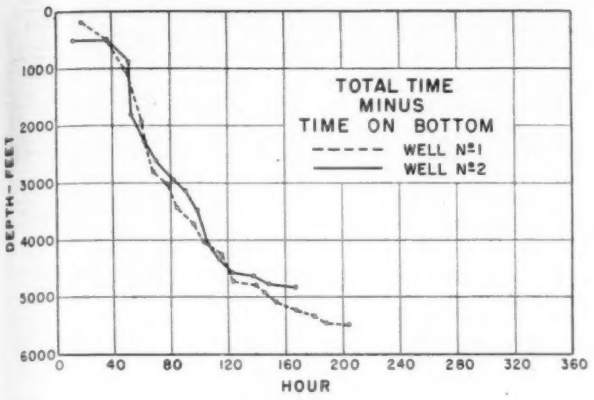


Fig. 3

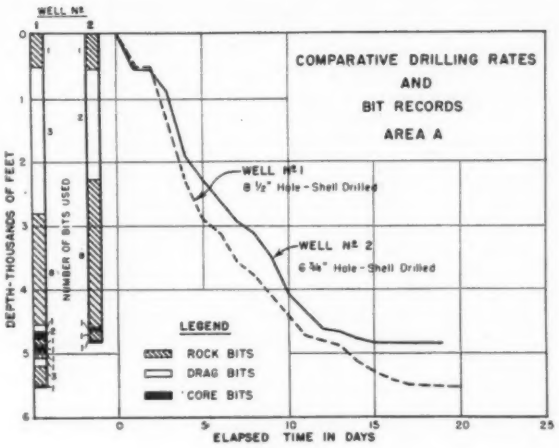


Fig. 4

hole and heavy pipe combination.

Although direct well-cost comparisons are exceedingly unreliable, it is fortunate that since the drilling of the initial tubing-drilled hole in 1946 there are four other areas in which detailed cost comparisons can be made. In two of these areas only one tubing-drilled hole and one large hole were drilled. In another area, five wells were drilled; two of these wells were drilled by contractors and the other three by Shell using 3½-in. tubing as drill pipe. In the remaining area, eight wells were drilled of which three were tubing-drilled holes, and the other five were drilled with contract tools using 4½-in. drill pipe and drilling an 8½-in. hole.

Even in areas known to be fairly comparable in drilling rates, it is difficult to directly compare well costs, particularly in wildcat or semiwildcat drilling. This is further complicated owing to the rapid increase in material and labor cost which took place in 1945, 1946, and 1947. An attempt has been made to compare costs through the use of a commodity index chart (Fig. 6). This chart was prepared with the aid of our purchasing department and must be used with caution as no attempt was made to ascertain the exact per cent increase of detailed items. However, each accounting classification was analyzed for per cent of tangible material cost and applicable commodity index and an adjustment made. All intangible costs including outside labor were adjusted in accordance with the labor index chart (Fig. 7).

Costs were adjusted only for the time increment from the drilling of the first to the last well in any one group. In this manner, it is believed that a truer difference in cost of tubing-drilled hole versus conventional hole is obtained. Table 1 gives an example of the technique employed to analyze and adjust costs in accordance with the commodity indices.

Caution in Cost

The wells drilled in area "E" offer the best comparative data as they are the most numerous as well as the most recent. Again caution must be exercised in directly comparing these adjusted well costs because in some instances wells were abandoned without setting casing while others were abandoned after setting casing and still others were completed as producing wells. Additionally, various numbers of days were consumed in making tests before completing or abandoning.

A recapitulation of the wells drilled in area "E" necessitates their division as shown in Table 2. This recapitulation indicates that wells drilled in this area with Shell tools using tubing as drill pipe saved an average of about $6 per foot. It should be stated that Well 15 was a consecutive well for the contractor whereas Shell Well 13 was the first Shell-drilled well in the area and required moving equipment about 400 miles.

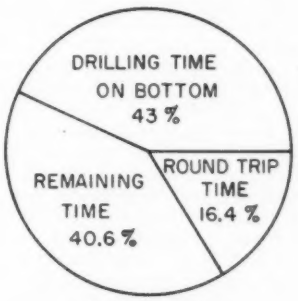
Also of interest is the average comparable daily operating cost in this area for the small rig using tubing as drill pipe and a larger contract

TABLE 1—ADJUSTMENT OF COSTS ACCORDING TO COMMODITY INDICES

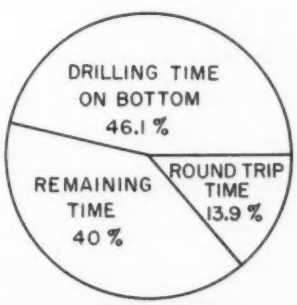
Area "E"—Well No. 12. Date completed: February 5, 1946. Total depth: 5,528 ft.

Item—	Total cost (dollars)	Index used*	Index values: At date of drilling well	Index values: At date of last well drilled in group	Increase (per cent)	Adjusted cost (dollars)
Labor	86,717	W	235	285	21.2	105,101
Service facilities	401	A	111	161	45	581
Tool rental	292	A	111	161	45	423
Drilling materials and supplies	7,243	A	111	161	45	10,502
Rig foundation	306	B	134	214	59.6	488
Cementing material	1,057	B	134	214	59.6	1,687
Mud material	4,065	N	88	139	51	6,138
Casing	7,335	F	112	132	30	9,536
Production equipment	3,440	F	112	132	30	4,472
Total	110,856					138,928
Cost per foot	20.05					25.10

*Indices according to Fig 1: A—average, I—industrial, B—building material, N—nonferrous, F—ferrous, W—wages (crew costs) in accordance with Fig. 2.



WELL NO. 1
(to 4800 ft.)
8½" Hole Shell Drilled



WELL NO. 2
6¾" Hole Shell Drilled

Fig. 5—Comparison of various percentages of total rig time.

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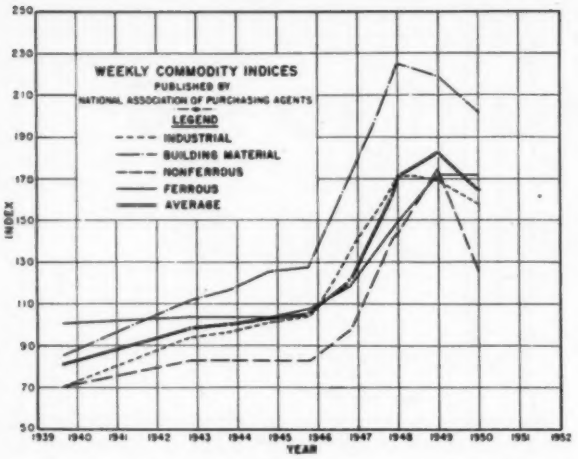

Fig. 6

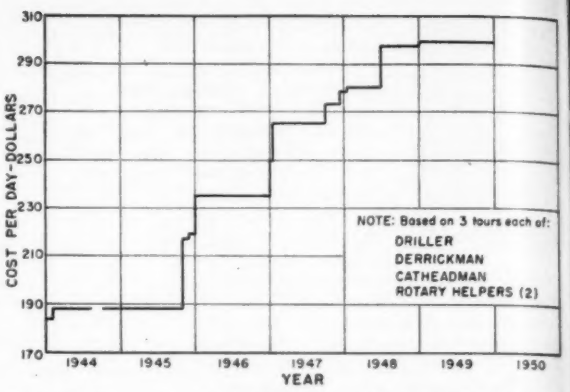

Fig. 7—Daily wage costs of drilling crews (including labor burden) to indicate drilling-labor cost trends, 1944-1949.

rig (adjusted for wage and material differences by multiplying actual daily operating cost times per cent increase of average commodity indices as plotted in Fig. 6), the former being $767 per day and the latter $1,647 per day, or a difference of $880 per day. For comparative purposes this difference should be reduced by $110 per day as tool depreciation is not included as a cash operating cost on Shell rigs.

As a further check on tubing-drilled holes, the daily rate of progress for each well was plotted by areas, (area "B"—Fig. 8, area "C"—Fig. 9, area "D"—Fig. 10, area "E"—Fig. 11). Area 'E" again offers the best data. It is extremely interesting to note that in this area a 6¾-in. tubing-drilled hole penetrated to the area's comparable depth of 5,118 ft. in 14 days. Three other wells reached this depth in 15 days, one of which was a tubing-drilled hole. In 17 days another 8½-in. hole reached this depth followed by a tubing-drilled hole in 20 days, the latter being the first tubing-drilled hole in the area. The two holes which made the slowest progress were 8½-in. in diameter; one was the discovery well and the other had a 15-day fishing job.

A recapitulation of adjusted well costs in the other two comparable areas is shown in Table 4.

Differences in depths of the wells in area "D" make direct cost comparisons difficult but it is of interest that the tubing-drilled hole reached its maximum depth of 5,000 ft. in 37 days at a daily operating charge of $860 whereas the conventional hole reached 5,000 ft. in 37¼ days with a daily operating charge of $988 ($1,300 adjusted).

Adverse weather encountered in drilling the first tubing-drilled hole in area "C" (Well 5) resulted in its cost being higher than normal.

In addition to the wells already mentioned, three other wells were drilled with 3½-in. tubing, the most interesting of which is a 6¾-in. hole that was carried to a depth of 10,319 ft. Needless to say, this well was carried deeper than originally anticipated but it illustrates the ability of the 3½-in. tubing and the Acme-thread joints to take punishment.

Before starting the deep well, a 16,920-ft. string of 3½-in. Acme-thread drill tubing with collars was purchased at a cost of $12,819, or about $0.755 per foot. At the completion of this well (202 days drilling), approximately 1,850 ft. of tubing had been retired which has a salvage value of 50 cents per foot, making the net cost to the well about $460. In addition, 804 collars were used (including 241 replaced at the completion of the well) at a cost of $2,725 to which should be added rig time for changing 563 collars at the rig (2 minutes per collar at 61 cents per minute) or $685.

If we assume that the pipe used is 50 per cent depreciated which would amount to ($0.755 — 0.50 × 10,319 ft.) × 50 per cent = $1,315, this gives a total cost of $460 + $2,725 + $685 + $1,315 = $5,185 for 202 days' operation, or $25.66 per day for depreciation and maintenance of drill tubing. As previously stated, no direct comparisons with drill-pipe costs are available but comparing the foregoing to a minimum drill-pipe rental figure of $0.01 per cent per day leaves little doubt as to the saving possible with drill tubing.

(Continued on page 82)

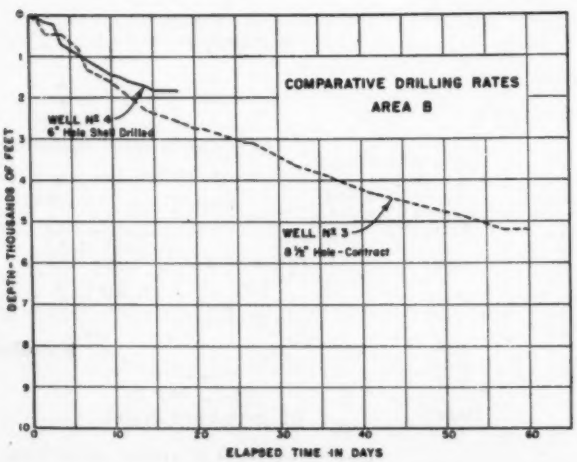

Fig. 8

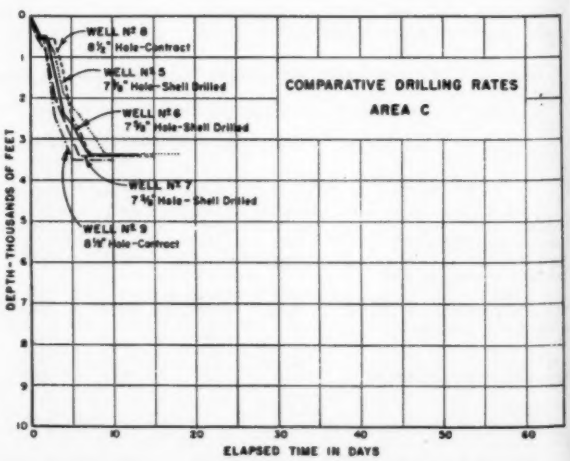

Fig. 9

WATER-FLOOD OPERATIONS

IN ILLINOIS, INDIANA, KENTUCKY, OHIO, MICHIGAN, AND WEST VIRGINIA

by R. R. Vincent* and K. P. Huffman†

Part 1—Water-Flood Operations, Illinois-Michigan

FOR purposes of discussion, the State of Illinois is divided here into three arbitrary geographical areas. **The first area** comprises the counties of Edgar, Clark, Coles, Crawford, Cumberland, Lawrence, and Wabash; **the second** the counties of Clay, Edwards, Effingham, Gallatin, Hamilton, Jasper, Richland, Wayne, and White; **the third** the counties of Bond, Clinton, Fayette, Franklin, Jefferson, Madison, Marion, Perry, St. Clair, and Washington.

Area 1.—This has 14 floods in operation with flooding depths ranging from 500 to 2,600 ft. The operators, except in a few instances, are employing fresh water as the flooding medium, the supply source being gravel beds or shallow wells. Water treatment of some type, usually aeration and filtration, is employed. The five-spot is the predominate flood pattern. Data for floods in Area 1 are listed in Table 1.

Area 2.—There are 14 floods in operation here, 4 of which are dump floods. The word "dump" is used to designate a flood in which the pipe has been ripped, shot or perforated in an upper water zone in one or more wells, and a flood over which very little control is exercised. Data for floods in Area 2 are listed in Table 2.

Attention is directed towards the greater depths encountered in this area, ranging from 3,000 to 3,200 ft. The area contains one proposed flood.

Area 3.—This has five floods in actual operation. In addition, there are two proposed floods. The flooding depths range from 1,410 to 1,900 ft., with the five-spot flood pattern again predominating. Data for floods in Area 3 are listed in Table 3.

Illinois has a total of 11 pattern floods that can be classified as past the pilot stage of development, and 17 in the pilot stage. There are three areas where dump flooding predominates.

Michigan has no active floods at the present time. However, tentative plans have been made for one pilot development.

Present-Day Trends

We would like to consider briefly the operators' present-day thoughts concerning future water-flood development.

In the past, operators generally used fresh water for flooding. In recent years, the trend is toward the use of a subsurface supply, with the open-type system giving way to the closed system. Water treatment is considered necessary in both systems.

The general trend has been to wider spacing between like wells with the conversion of alternate oil wells to injection wells.

An increasing number of floods are

*Sohio Petroleum Co., Centralia, Ill.
†Sohio Petroleum Co., Owensboro, Ky.
Paper presented at spring meeting, Eastern District, A.P.I. Division of Production, Cleveland, April 26-28.

TABLE 1—WATER FLOODS IN EDGAR, CLARK, COLES, CRAWFORD, CUMBERLAND, LAWRENCE, AND WABASH COUNTIES, ILLINOIS—PRIMARY DATA

Flood No.	Pool name and operator—	Producing formation	Discovery date	Depth (ft.)	Sand thickness (ft.)	Developed acreage	Recovery (bbl.)	Recovery (bbl. per acre)	Type structure	Original b.h.p. (psi.)	Oil gravity, °A.P.I.
1	Bellair—Forest	500-ft. sand	1908	500	42	200	....	....	Dome	....	30.0
2	Bellair—Pure	500-ft. sand	1908	500	22	443	2,000,000	....	Stratigraphic	200	32.0
3	Bridgeport—Ohio	Bridgeport	1906	900	50	....	....	....	....	....	32.0
4	Browns, E.—Magnolia	Cypress	1946	2,600	12	174	49,125	....	Stratigraphic	....	36.0
5	Casey—Forest	Casey	....	450	27	....	....	....	Dome	....	30.0
6	Galvin, No.—Magnolia	Biehl	1943	1,800	15	10	34,000	....	Lense	....	32.0
7	Friendsville, No.—Magnolia	Biehl	1946	1,500	15	40	12,933	....	Stratigraphic	....	35.0
8	Johnson, No.—W. L. Pickens	Casey	1906	450	15	300	....	....	Lense	....	§32.0
9	Johnson, So.—Forest	Upper Partlow	....	475	55	....	....	....	Dome	....	30.0
10	Main—Tide Water	Robinson	....	900	22	110	....	8,000	Lense	....	35.0
11	Robinson—Ohio	Robinson	1905	900	20	....	....	....	....	....	34.0
12	Robinson—Ohio	Robinson	1905	900	20	....	....	....	....	....	34.0
13	Siggins—Forest	1st Siggins	1906	400	38	3,000		3,600	Dome	....	32.0
14	Siggins—Pure	1st Siggins	1906	500	25	402	2,000,000	....	Stratigraphic	200	35.5
		2nd Siggins	1906	500	6	269		....			

WATER-FLOOD DATA

Flood No.	Date started	Water flood acreage	Avg. porosity (%)	Avg. perm. (md.)	Oil saturation (%)	Water saturation (%)	Flood pattern	No. wells—Intake	No. wells—Oil	Est. W.F. recovery (bbl.)	Flood water source	February 1, 1950—Cumulative injected water (bbl.)	February 1, 1950—W.F. recovery (bbl.)
1	1948	200	16.9	106	34.4	....	440-ft., 5-spot	56	*60	800,000	Glacial drift†	3,100,000	.....
2	1948	443	18.6	149	36.0	44.0	440-ft., 5-spot	131	*125	1,400,000	Gravel beds†	4,219,630	.....
3	1948	114	....	....	....	....	660-ft., 5-spot	9	29	.....	Shallow Wells†	518,200	.....
4	1947	168	18.0	100	....	....	Line drive	3	12	.....	Tar Springs‡	252,986	.....
5	1950	22	16.1	122	25.7	....	440-ft., 5-spot	13	5	44,000	Glacial drift	....	.....
6	1947	10	19.0	85	....	....	660-ft., 5-spot	1	4	.....	Penn. sand	96,053	.....
7	1947	18	16.0	81	....	....	660-ft., 5-spot	2	3	.....	Penn. sand	109,843	.....
8	1949	50-60	19.0	200	45.0	25.0	5-spot irregular	18	17	.....	Gravel beds	600,000	20,000
9	1950	60	16.4	285	31.2	....	440-ft., 5-spot	24	14	150,000	Glacial drift†	1,292,000	.....
10	1948	30-35	22.0	175	45.0	14.0	440-ft., 5-spot	9	9	140,000	Basal Penn.‡	370,000	50,000
11	1948	89	....	....	....	....	440-ft., 5-spot	24	30	.....	Gravel beds	278,000	.....
12	1948	113	....	....	....	....	440-ft., 5-spot	25	37	.....	Gravel beds	868,000	.....
13	1942	1,300	16.7	42	32.0	....	440-ft., 5-spot	322	251	4,875,000	Glacial drift	14,895,000	.....
14	1946	402	18.5	45	29.8	52.2	440-ft., 5-spot	125	123	1,600,000	Gravel beds†		
	1948	269	18.3	66	26.7	52.5	440-ft., 5-spot				Gravel beds†	4,197,798	.....

Note: None of above pools had natural water drive. *Production by flowing. †Treated fresh water. ‡Untreated brine. §Oil viscosity (cp.) 18.0.

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operating under some form of unitization, showing that operators are more carefully weighing the advantages all parties can realize when the prospective gains and risks are mutually shared.

Newly discovered fields are being considered as water-flood prospects early in their productive life in order to realize a greater ultimate recovery through early water injection.

Future Prospects

The A.P.I. reserve estimate for Illinois as of January 1, 1950, was 468,000,000 bbl. Of this amount, 134,000,000 bbl. or 28.6 per cent was attributed to secondary-recovery projects now under way. The state currently is producing 185,000 bbl. daily and it is estimated that at least 10,000 bbl. is water-flood oil.

As the number of floods increase, it is reasonable to assume that water-flood oil will account for a greater percentage even though new fields will be found and developed.

Part 2—Indiana, Kentucky, Ohio, and West Virginia

Indiana.—Indiana has had very little water-flood development to date. To the authors' knowledge only three floods are in operation at the present time.

The only pattern flood on which we have any data is unusual, with reference to the rest of the area, in that so-called alternate 440-ft. spacing is being used. This results in a water-to-water spacing of 620 ft. or approximately 8.9 acres per five-spot, and does not require the drilling of any new wells.

Kentucky.—Water flooding in Kentucky is confined principally to the western part of the state. Although some pilot floods are in operation in eastern Kentucky, no data have been released on them to date.

The initial project in the western Kentucky area was started in 1941. At the present time it is estimated that approximately 1,500 acres are under water flood. This includes pattern and flank, or peripheral floods, as well as some floods which are not listed in Table 4 due to inability of the authors to secure the necessary information.

Ohio.—Water flooding was commenced in Ohio in 1939, shortly after water flooding was legalized in the state, by the drilling of nine water-intake wells and four producing wells to the Berea sand in Chatham pool, Medina County. Since that time the pool has been progressively developed until at the present time there are 800 acres being flooded.

The unusually erratic occurrence of the Berea sand, wide range of permeabilities, and great variations in saturations result in a wide range of input volumes. Due to these erratic conditions it is necessary to inject and produce large volumes of water to obtain the water-flood oil production.

West Virginia.—Water injection was started in 1937 in three wells in Cabin Creek field. Since then development has been slow but at the present time water is being injected into 95 wells in the field by two different operators. The area is unusual in that the seven-spot pattern is being used. This was due to the original drilling pattern of the field and also because it was considered economically necessary to use old wells.

Summary

For the most part the areas discussed are comprised of stripper or marginal leases. As a result of the poor condition of the surface and subsurface equipment, much of which has been in use for 20-30 years, it is necessary to redrill a large percentage of the properties. The poor condition of the well equipment also brings more complications insofar as plugging of off pattern wells is concerned.

In many vacuum and/or gas or air repressuring has been previously practiced. This has resulted in depleted zones of high permeability in many cases which give considerable difficulty during the flooding operations.

TABLE 2—WATER FLOODS IN CLAY, EDWARDS, EFFINGHAM, GALLATIN, HAMILTON, JASPER, RICHLAND, WAYNE, AND WHITE COUNTIES, ILLINOIS—PRIMARY DATA

Flood No.	Pool name and operator—	Producing formation	Discovery date	Depth (ft.)	Sand thickness (ft.)	Developed acreage	Recovery (bbl.)	Recovery (bbl. per acre)	Type structure	Original b.h.p. (psi.)	Oil gravity, °A.P.I.
1	.....	.....	1944	1,900	13	350	.....	....	Stratigraphic	800	†34.0
2	Albion, So.—Superior	Bridgeport	1944	1,900	20	192	390,000	2,031	Lense	750	35.0
3	Alden*—Texas	Aux Vases, McClosky	1938	....	13	1,040	.....	....	.....	...	....
4	Blairsville—Texas	Aux Vases, McClosky	1942	....	20	640	.....	....	.....	...	....
5	Cians District—Pure	McClosky	....	....	....	....	.....	....	.....	...	....
6	Clay City Dist.—Pure	McClosky	....	....	....	....	.....	....	.....	...	....
7	Noble—Pure	McClosky	....	....	....	....	.....	....	.....	...	....
8	New Harmony—Sun	McClosky	1939	2,900	7	40	81,000	2,025	Porosity trap	...	37.0
9	New Harmony—Sun	McClosky	1940	2,900	5	100	330,000	3,300	Porosity trap	...	36.0
10	New Harmony—Sun	Bethel	1940	2,750	23	275	.....	....	Blanket sand	...	38.0
11	New Harmony—Superior	Waltersburg	1939	2,220	40	490	6,800,000	13,878	Lense	975	36.0
12	Olney, East*—Texas	.....	....	....	....	....	.....	....	.....	...	....
13	Ste. Marie—Texas	.....	....	....	....	....	.....	....	.....	...	....
14	West Grayville, S. C. Yingling	Biehl	1948	1,900	17	172	171,600	1,000	Stratigraphic	800	38.0
15	Maunie, So.—Magnolia	Tar Springs	1941	2,200	16	280	484,000	....	Stratigraphic	...	37.0

WATER-FLOOD DATA

Flood No.	Date started	Water flood acreage	Avg. porosity (%)	Avg. perm. (md.)	Oil saturation (%)	Water saturation (%)	Flood pattern	No. wells: Intake	No. wells: Oil	Est. W.F. recovery (bbl.)	Flood water source	February 1, 1950: Cumulative injected water (bbl.)	February 1, 1950: W.F. recovery (bbl.)
1	1946	350	20.0	325	....	29.9	Peripheral	3	18	.....	Hardinsburg†	520,000	....
2	1946	192	19.7	304	22.0	29.0	Spot	3	30	106,400	Bridgeport†	.....	85,000
3	....	....	....	....	....	....	Peripheral	3	21	.....	Penn. sand†	.....	.....
4	....	....	....	....	....	....	Peripheral	2	21	.....	Penn. sand†	253,000	.....
5	1945	....	....	....	....	....	Dump	..	..	.....	.....	.....	.....
6	1944	....	....	....	....	....	Dump	..	..	.....	.....	.....	.....
7	1944	....	....	....	....	....	Dump	..	..	.....	.....	.....	.....
8	1948	40	....	....	....	....	Spot	1	1	10,000	Gravel bed‡	25,000	2,700
9	1949	60	....	....	....	....	Spot	2	3	50,000	Gravel bed‡	270,000	15,000
10	1949	....	17.0	20	25.0	30.0	20-ac., 5-spot	2	4	.....	Gravel bed‡	250,000	.....
11	1946	490	20.0	516	24.0	25.0	Line drive	3	43	.....	Waltersburg†	1,500,000	170,000
12	Proposed	....	....	....	....	....	.....	..	..	.....	.....	.....	.....
13	....	....	....	....	....	....	Dump	..	..	.....	.....	.....	.....
14	1949	172	20.2	265	22.4	23.6	Flank injection	2	9	1,326,000	600-ft. water sand†	139,000	26,742
15	1947	180	18.0	500	....	....	20-ac., 5-spot	13	14	.....	Penn. sand‡	1,248,383	.....

*Natural water drive present, others none. *All projects produced by pumping. †Untreated brine. ‡Untreated fresh water. §Viscosity (cp.) 7.9.

TABLE 3—WATER FLOODS IN BOND, CLINTON, FAYETTE, FRANKLIN, JEFFERSON, MADISON, MARION, PERRY, AND ST. CLAIR COUNTIES, ILLINOIS—PRIMARY DATA

Flood No.	Pool name and operator—	Producing formation	Discovery date	Depth (ft.)	Sand thickness (ft.)	Developed acreage	Recovery (bbl.)	Recovery (bbl. per acre)	Type structure	Original b.h.p. (psi.)	Oil gravity, °A.P.I.
1	Benton*—Shell	Tar Springs	1941	2,100	35	2,200	20,200,000	9,180	Anticline	850	38.0
2	Boyd—Superior	Bethel	1944	2,050	17	673	1,800,000	2,675	Lense	700	36.0
3	Centralia	Benoist	1937	1,400	....	....	.....	....	.....	....	....
4	Odin—Ashland	Cypress	1945	1,700	11	354	380,736	1,076	Dome	700	37.0
5	Patoka*—Sohio	Benoist	1937	1,410	27	565	2,800,000	4,952	Anticline	550	39.0
6	Patoka—Sohio	Rosiclare	1937	1,550	9	469	153,000	326	Anticline	600	40.0
7	Salem—Texas	.....	....	....	....	....	.....	....	.....	....	....

WATER-FLOOD DATA

Flood No.	Date started	Water flood acreage	Avg. porosity (%)	Avg. perm. (md.)	Oil saturation (%)	Water saturation (%)	Flood pattern	No. wells¶ Intake	No. wells¶ Oil	Est. W.F. recovery (bbl.)	Flood water source	February 1, 1950 Cumulative injected water (bbl.)	February 1, 1950 W.F. recovery (bbl.)
1	1949	1,900	19.0	65	....	....	20-ac., 5-spot	84	120	.....	Lake†	1,600,000	.....
2	1945	673	18.0	150	20.0	24.0	Line drive	3	58	.....	Bethel‡	2,380,000	.....
3	Proposed	....	....	....	....	....	.....	..	..	.....	.....	.....	.....
4	1949	196	20.0	78	65.0	33.0	Peripheral	10	20	945,000	Tar Springs§	26,000	.....
5	1943	527	19.0	110	53.0	20.0	660-ft., 5-spot	62	81	6,400,000	Tar Springs‡	16,300,000	5,451,000
6	1948	469	18.8	223	65.0	30.0	Peripheral	14	12	1,500,000	Tar Springs‡	454,300	219,000
7	Proposed	....	....	....	....	....	.....	..	..	.....	.....	.....	.....

*No natural water drive present. †Treated fresh water. ‡Treated brine. §Untreated brine. ¶All projects produced by pumping.

The problem of an adequate water supply varies widely. For the most part, the areas being flooded have been blessed with a good local water supply. This is not true in western Kentucky where most of the water sands are lenticular and of small areal extent. Rivers offer a possible source of water supply but a supply that requires large expenditures for lines and plants.

The active water-flood projects in the area vary from 300 to 3,000 ft. in depth. The cumulative injected water to produced oil ratio varies from 3-26 to 1.

The only limestone reservoir flood which has recovered any appreciable

TABLE 4—ACTIVE WATER-FLOOD PROJECTS IN INDIANA, KENTUCKY, OHIO, AND WEST VIRGINIA—PRIMARY DATA

Flood No.	Pool name, state and operator	Producing formation	Depth (ft.)	Sand thickness (ft.)	Developed acreage	Recovery (bbl.)	Recovery (bbl. per acre)	Type structure	No. wells drilled	Oil viscosity (cp.)
1	Birk City, Ky.—Several	McClosky lime	1,875	14	386	1,464,000	3,800	Monoclinal nose	39	..
2	Cane Run, Ky.—Cumberland & Kemrow	Waltersburg	625	20	25	55,800	2,230	.....	14	..
3	Cane Run, Ky.—Ellis et al	Waltersburg	625	20	20	34,800	1,740	.....	8	..
4	Corydon, Ky.—Sun Oil Co.	McClosky lime	2,600	6	86	234,500	2,780	Porosity trap	5	..
5	Dundee, Ky.—Sohio Pet. Co.	Cypress	525	14	135	198,500	1,470	.....	55	10
6	Friendship, Ky.—Sohio Pet. Co.	Hardinsburg	525	19	18	48,000	2,670	Strat. trap	12	13
7	Haynesville, Ky.—Cumberland & Kemrow	Tar Springs	375	18	53	233,900	4,410	.....	31	..
8	Uniontown, Ky.—Sun Oil Co.	Waltersburg	1,800	25	180	450,000	2,500	.....	18	5
9	Weller, Ky.—Felmont Oil Co.	Tar Springs	685	25	450	2,700,000	6,000	Strat. trap	170	8
10	Weller, Ky.—Sohio Pet. Co.	Tar Springs	685	28	193	1,247,600	6,480	Strat. trap	79	8
11	Dodds Ridge, Ind.—Ohio Oil Co.	Pennsylvanian	850	30	....	.....	....	.....	..	..
12	Heusler, Ind.—Sun Oil Co.	Waltersburg	1,750	10	175	438,000	2,500	Strat. trap	..	..
13	Chatham, Ohio—Preston Oil Co.	Berea	430	75	135	131,000	970	Monoclinal	..	..
14	Chatham, Ohio—Dymo Oil Corp.	Berea	375	43	440	1,485,000	3,380	Monoclinal	73	10
15	Chatham, Ohio—Conklin & Whitman	Berea	400	....	180	.....	....	Monoclinal	..	..
16	Chatham, Ohio—Belmont Quadrangle	Berea	400	....	117	232,100	1,990	Monoclinal	..	..
17	Cabin Creek, W. Va.—Pure Oil	Berea	3,000	13	2,700	10,621,800	3,940	Monoclinal	..	2
18	Cabin Creek, W. Va.—Preston	Berea	3,000	14	420	1,332,500	3,170	Monoclinal	..	..
19	Jeffries, Ind.—Magnolia	Clore	....	11	120	44,913	....	Stratigraphic	..	..

WATER-FLOOD DATA

Flood No.	Date started	Water flood acreage	Average porosity (%)	Avg. perm. (md.)	Oil saturation (%)	Water saturation (%)	Flood pattern	No. wells* Intake	No. wells* Oil	Flood water source	Cumulative injected water (bbl.)	W.F. rec. 1-1-50 (bbl.)
1	1945	386	13	350	...	...	Peripheral	4	24	Wells†	1,500,000	303,000
2	1941	29	21	65	42	31	5-spot	15	11	Wells‡	1,701,000	108,000
3	1945	18	21	41	43	31	5-spot	11	9	Wells‡	545,000	84,000
4	1947	33	...	...	...	...	Flank	1	3	Wells†	135,100	13,200
5	1950	50	17	100	50	20	5-spot	10	13	Wells§	0	0
6	1948	10	...	...	...	...	Irregular	2	4	Wells†	43,000	3,600
7	1945	39	20	61	57	15	5-spot	18	28	Surface‡	895,500	129,000
8	1947	...	18	56	...	30	Flank	2	15	Produced¶	193,200	9,100
9	1949	311	20	100	50	25	5-spot	68	80	River‡	1,213,000	0
10	1949	175	20	100	50	25	5-spot	28	40	River‡	232,000	0
11	1949	75	...	...	...	...	5-spot	11	19	Wells†	200,000	0
12	1946	70	19	282	...	30	Flank	2	8	Produced¶	202,000	62,000
13	1944	52	17	75	35	38	5-spot	47	44	Surface‡	4,790,000	215,000
14	1939	440	17	75	35	...	5-spot	107	222	Wells‡	.....	1,330,000
15	...	180	...	...	...	...	5-spot	71	98	(‡)	.....	.....
16	1941	117	...	...	...	...	5-spot	74	62	(‡)	8,412,000	378,300
17	1937	...	15	60	42	20	7-spot	86	45	Surface‡	11,000,000	425,000
18	1948	73	...	...	..	...	7-spot	9	7	Surface‡	367,700	21,900
19	1948	75	18.6	203	...	...	5-spot	4	12	Penn. sand§	236,033	.....

*All projects produced by pumping. †Untreated brine. ‡Treated fresh water. §Untreated fresh water. ¶Treated brine.

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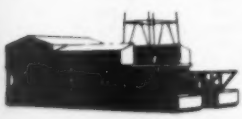

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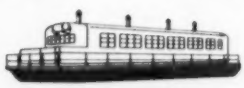

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amount of oil is the Birk City project in Daviess and Henderson counties, Kentucky. A total of 303,000 bbl. of water-flood oil has been recovered from 386 acres. This amounts to about 800 bbl. per acre. It is estimated that the ultimate recovery will be 1,100 bbl. per acre.

Sufficient information was available on only six projects to compare primary recovery and water-flood recovery on planned-pattern water-flood projects. On those the primary recovery amounted to 2,750 bbl. per acre while the water-flood oil recovered to January 1, 1950, has amounted to 3,230 bbl. per acre, with some additional water-flood oil yet to be recovered.

To the writers' knowledge only one cooperative and one unitized project is now in operation in the area. Two or three additional cooperative programs are in the planning stage in western Kentucky and these will probably follow the general trend previously established in the Illinois basin.

It is estimated that at least 3,000 acres are now under water flood in the states of Indiana, Kentucky, Ohio, and West Virginia. Of this amount at least 900 acres have been developed during the past 2 years. These developments are being watched with interest by operators in the area and future developments may be greatly influenced by the performance of these floods.

OPERATING IDEAS

Heating System for Treating Plant

HEATING of freshly produced oil to the desired temperature for breaking emulsions and separating formation water in electrical dehydrators is being accomplished in East Los Angeles field with steam generated automatically in a conventional oil-field boiler without the loss of steam condensate. The boiler is one which has been employed on steam - powered rotary - drilling rigs and is mounted on an all-steel skid-type foundation.

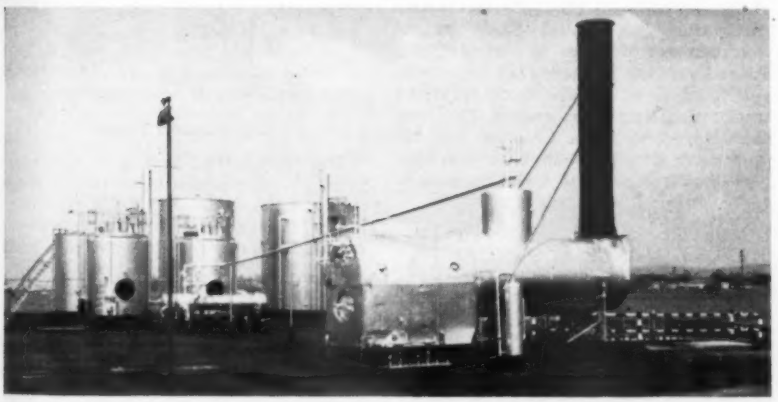
Equipped with instruments which control fuel, the boiler supplies low-pressure steam with the least amount of attention and does not require a licensed fireman for each tour. Automatic equipment is installed which will shut off the supply of fuel if a break occurs in the condensate return system.

Heating equipment consists of two shell-and-tube heat exchangers for transferring heat from the low-pressure steam to the oil from the producing wells in the treating area. The steam line from the boiler dome slopes from the boiler to the exchangers to avoid trapping of condensate. Pipe posts support the steam line which is held securely to the supports with bolted saddles.

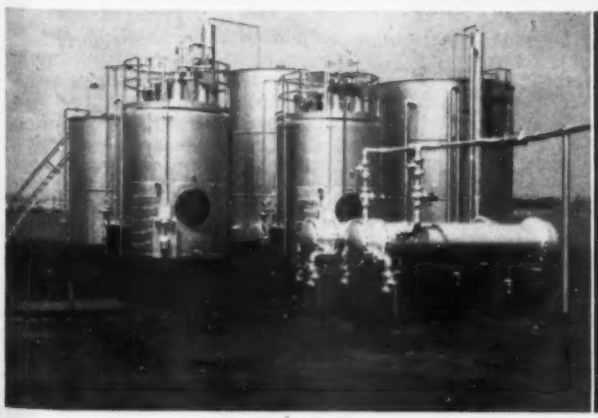
The steam line at the exchangers is connected to a distribution manifold so that the required volume of steam will flow to each exchanger unit. Desired temperature for the oil is obtained with thermostat-controlled valves which operate as throttles just above the exchanger where the manifold line is attached to the shell. Oil at 160° F. flows from the heating unit to the dehydrators where the water and salt are removed and disposed of through a waste water system.

Steam condensate flowing through the exchangers is never released to open tanks or vessels, nor is the pressure reduced on the system except by condensation. The water flows by gravity from the shells of the exchangers to a small horizontal pressure tank set in a concrete-lined pit below ground level. An automatic liquid-level controller operates an electric switch which controls the operation of a condensate return pump so that the water is fed back into the boiler.

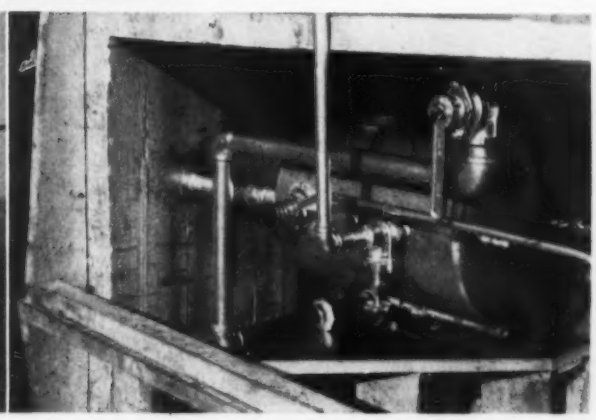
All connections in the heating system are made with special attention toward avoiding leaks. No water condensate escapes from the system and replenishing of the supply to the boiler is practically eliminated. Water for charging the system is treated for scale and corrosion control and long operating life is anticipated without need of makeup water.



AUTOMATICALLY EQUIPPED BOILER.— Serves as oil heating unit in East Los Angeles oil field. Exchangers and the dehydrators appear at left rear.



Lower left: Closeup of the battery of shell-and-tube exchangers and dehydrating units.



Lower right: Condensate accumulator in concrete-lined pit, with liquid-level controller. Electric boiler feed pump is placed at side under stairway at left.

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FLOATING COMPRESSOR PLANTS

The portability of floating compressor plants is well demonstrated by this illustration showing the unit being towed by a small craft. The uprights at each corner are spuds for mooring the unit when it is in service. Thus secured, it rises and falls with changes in water level. By the aid of stops welded on the spuds and the use of logs it is possible to remove the spuds by means of a short-stroke hydraulic jack.

by J. D. Goodrich

THE absence of suitable foundation soils in large areas along the Louisiana Gulf Coast is one of the many problems faced in developing oil fields in this region. To the engineer responsible for seeing that equipment is installed and will operate properly, it is one of the most important. Likewise, to management it is of prime concern because of the large expenditures often required in order to secure suitable foundations. The now familiar submersible drilling barge proved the answer to this problem insofar as drilling was concerned and the successful development of a floating compressor barge by Shell Oil Co. appears to be the answer for this type of equipment.

Large gas compressors are required in oil fields for two usual reasons: First, to boost low-pressure gas to a sufficiently high pressure for use in gas lifting wells; and, second, to boost low-pressure gas to a point that will permit its transmission for sale or return to an underground reservoir. In the past, the equipment has been placed on piling foundations, or on islands or earth fills whenever the latter happened to be present or could be made economically. Aside from the cost of the foundations, however, these installations were always expensive on account of the inaccessibility of the sites to construction crews, machinery and supplies. For the same reason, salvage costs and intangible losses were high. Thus, there was considerable need for better facilities on which to set up the equipment.

As a corollary of the development of an efficient submersible drill barge it was natural that attention should be directed toward the possibility of barge-mounted compressors. However, one departure was desirable. Instead of submerging the vessel, it should float, for (1) it could then be used in water of any depth so long as enough was available for flotation; (2) it could serve in areas subjected to periodic flooding without danger of inundating the machines; and (3) it would simplify and reduce construction costs and maintenance.

The author is a mechanical engineer with Shell Oil Co.'s regional staff at Houston. He received his bachelor of science degree in mechanical engineering in 1937 from Rice Institute. Immediately upon graduation he joined Shell as an engineering trainee at Wink, Tex. After finishing trainee work he moved to Houston as South Texas division mechanical engineer, and in 1942 was transferred to Lake Charles, La. He was next promoted to area mechanical engineer at New Orleans, and in 1949 assumed his present position.

The first unit built consisted of a barge 40 ft. long, 25 ft. wide, and 5 ft. deep on which is installed a 6XVG direct-connected two-stage compressor, together with all auxiliaries. Thus, to utilize the unit, it was necessary only to connect the suction and discharge lines and go to work.

The barge is raked on each end and compartmented by a collision bulkhead at each end and by one central longitudinal watertight bulkhead. All bottom, side, deck, and bulkhead plating are 5/16-in. thick, and sufficient transverse frames are provided to insure a vessel capable of withstanding any vibration set up by the compressor.

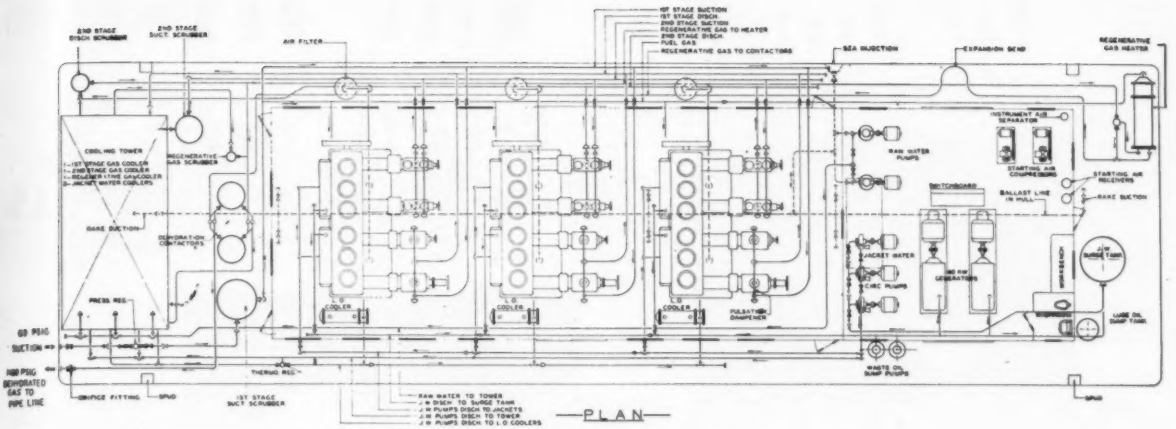
The size of the barge was determined not only by the physical dimensions required to mount the equipment but also with the thought in mind of keeping the vibrational movement within acceptable limits.

Unbalanced Forces

The unbalanced forces in the compressor are: maximum vertical force—primary nil, secondary 2,280 lb.; maximum horizontal force—primary nil, secondary 4,280 lb.; and couples, both vertical and horizontal, nil. Calculations, using these unbalanced forces, indicated that with a vessel of the aforementioned dimensions a maximum horizontal barge movement of 0.006 in. might be expected at a frequency of 700 vibrations per minute. Although it was believed that this amplitude might be objectionable, the craft was considered large enough because the calculations did not take into account the inertia of the water nor its capacity to dampen vibrations. Actually, when the unit was put in operation, the vibrations proved to be well within acceptable limits and did not exceed those experienced in most land plants.

The compressor is set up directly on the barge by means of babbitt pads beneath the bolt holes of the crankcase. This method has been found to be satisfactory and does not call for a machined crankcase base or foundation.

The cooling-water system for the



General arrangement of 1,800-hp. floating compressor station, 124 by 36 by 8 ft.

machine is of the thermostatically controlled closed type with the soft water and gas passing through open-type tube bundles at the stern. The raw-water pump is belt driven from the compressor flywheel and takes suction from the bow end. Discharge is through the spray tower in the stern of the barge. Starting air is furnished by a 3-hp. compressor equipped for automatic shutdown. The air receiver is mounted in the building trusses.

Inasmuch as the unit was designed for gas-lift service, it is equipped with a speed-pressure controller. For this type of work the controller is considered essential if the plant is to operate automatically—and unattended.

Further Safety Devices

Further safety devices provided are a relief valve and a high-pressure Mercoid switch for shorting out the magneto. These controls are set to operate in the following sequence: (1) in the event of a pressure buildup the speed-pressure controller will reduce the compressor speed to a minimum of 60 per cent of normal; (2) if this does not relieve the pressure buildup, the relief valve will then open; and (3) in the event the relief valve becomes stuck or for some other reason will not operate properly, the Mercoid switch will short out the magneto and stop the machine.

Four spuds, one on each corner of the barge, are provided for mooring purposes. These consist of 6.1 by 6.38-in. wide-flange beams around 25 ft. long. Stops are welded on the spuds at suitable intervals and dogs are furnished to permit removing the spuds by a short-stroke hydraulic jack. When anchored, the vessel is free to ride on the spuds, thus allowing for any change in water level.

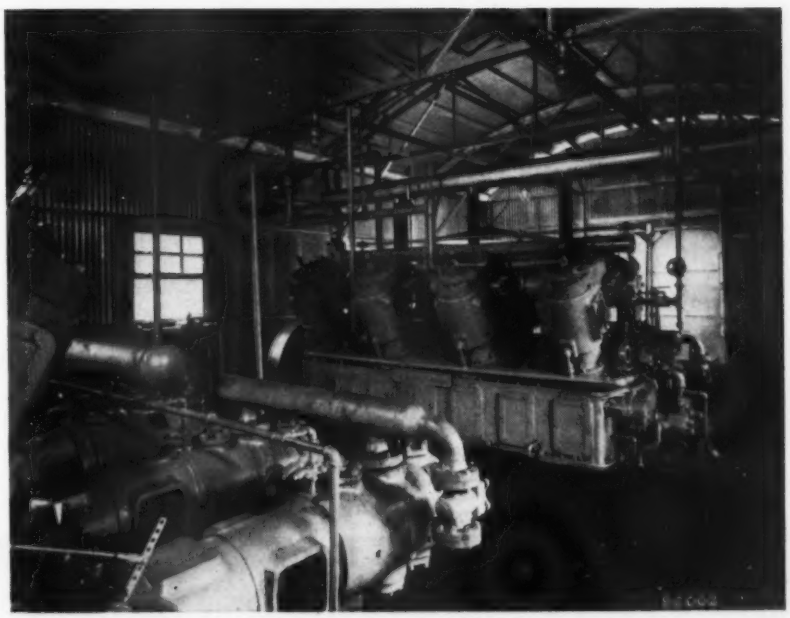
To insure shore connections of adequate flexibility, a conventional 6-in. oil-loading hose is used to bring the low-pressure gas (40 psig.) aboard, while the high-pressure gas (750 psig) is taken back to shore through connections made up of roller-bearing sections. Both have proved entirely satisfactory and permit the vessel to move short distances in any direction without danger of breaking the connections.

Second Barge Built

The compressor barge was put in operation in 1947 and proved to be so successful that a second one was constructed in 1948 for use in gas sales. It was patterned essentially after the first, the only basic difference being that it is 80 by 34 by 6 ft. in size and that it has two 300-hp. compressors. Thus, the vibrational effect of multiple units on a floating barge could be determined. This plant was completed and put in service around the middle of 1948 and is also giving a satisfactory account of itself. In operation, the vibration is approximately the same as that in the first (single-compressor) barge and also well within acceptable limits.

The development of these floating plants has answered a definite need in the case of oil fields located in remote swampy areas where suitable foundation soils are nonexistent and where ingress and egress can be had only by water. Among their apparent advantages are: (1) they can be built at convenient points where construction equipment and labor are readily available; (2) they can be salvaged in their entirety; (3) they can be easily moved around a field as areas requiring high-pressure gas change, thus eliminating the cost and the horsepower losses associated with long suction and discharge lines.

The checkered floor plating is approximately 15 in. above the barge deck and covers all piping except that carried overhead.



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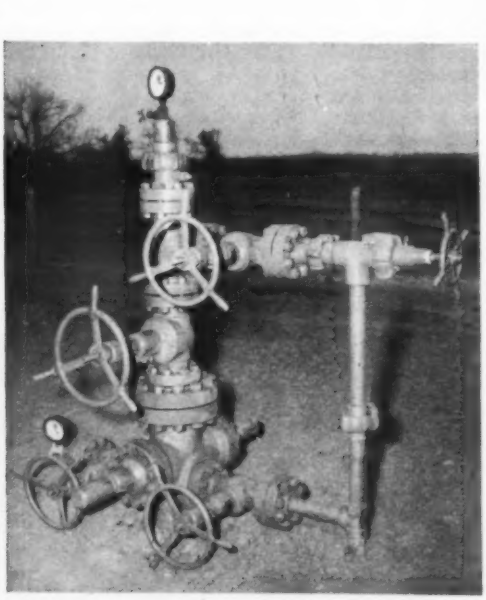

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RESEARCH ON

SHOOTING Oil and Gas Wells

by B. F. Grant,* W. I. Duvall,† L. Obert,† R. L. Rough,* and T. C. Atchison†

Current research by the U. S. Bureau of Mines on the problems involved in shooting oil and gas wells is described. The research is based on an experimental study by which the effects on rock of shots fired in shallow drill holes are being evaluated in terms of the strain produced in the rock by the explosion, the change in fluid conductivity of the shot holes, and the physical properties of the rock. Paper presented at spring meeting, eastern district, A.P.I. Division of Production, Cleveland.

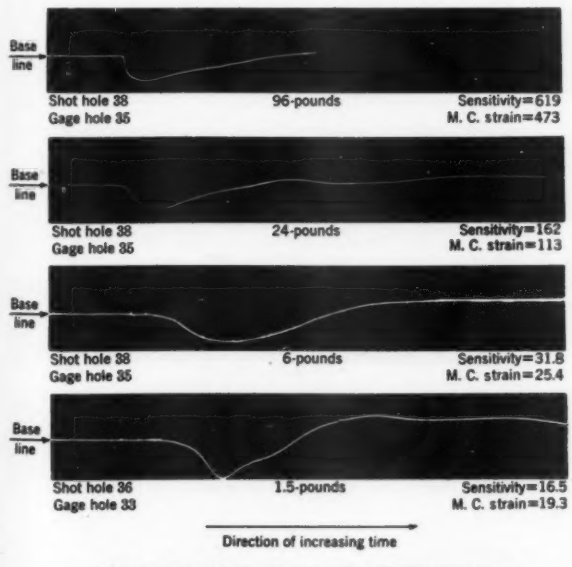
DURING the past 60 years shooting has been employed as a routine and valuable technique for completing or reconditioning oil and gas wells. The literature contains many studies[1] which have been made to define the factors affecting the results of well shooting. These studies, based on both the analyses of production rates measured before and after shooting and on theoretical considerations, have resulted in improvements in shooting techniques and, in certain areas, have given engineers a basis for predicting the results from shooting. However, no fundamental study has been made that would yield generally applicable criteria for designing the most efficient shot for a given well.

In the bureau's experimental program, four series of shooting tests were completed during 1949. These tests were specifically designed to determine the instruments best suited for field experimentation and to develop testing procedures that can be used, (1) to compare the different effects produced in rock as the type of explosive or the method used in loading, stemming or firing the explosive is varied, and (2) to correlate the characteristics of the strain wave produced by an explosive shot with the change in fluid conductivity of the shot hole.

A strain gage and recording equipment, developed in a previous investigation,[2] were employed in these tests to measure the dynamic strains developed in rock in place by a nearby explosion. Briefly, this technique employs resistance-wire strain gages bonded to a piece of core to form an assembly which is oriented and cemented into a diamond drill hole at the point where the measurement is desired. The output from each gage is passed through a preamplifier to an oscilloscope. The oscilloscope image is recorded by means of a drum camera on a moving film. Four-channel recording equipment was used.

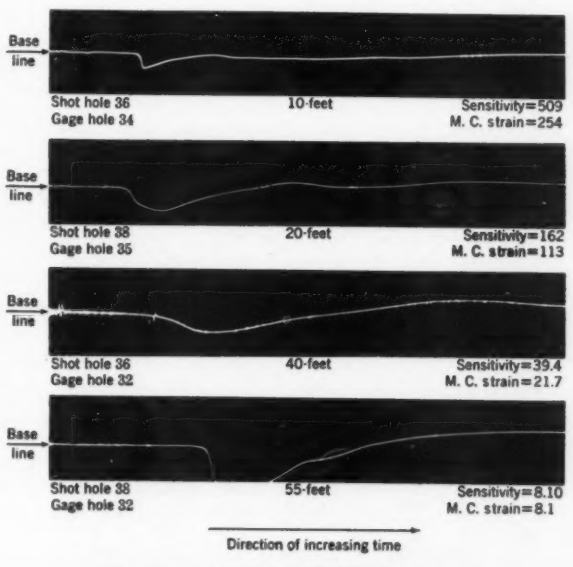
The site chosen for these tests was a farm, 3½ miles south of Franklin, Pa., where a 50-ft. section of massively bedded Homewood sandstone occurs under a soil cover less than 10 ft. thick. The physical characteristics of the coarse-grained, highly permeable sandstone at the test

*Petroleum engineer, Bureau of Mines, Franklin, Pa. †Physicist, Bureau of Mines, College Park, Md.



Note:–Downward deflection from base line indicates compression. Upward deflection from base line indicates tension.

Fig. 1—Examples of strain-time wave pulses at a distance of 20 ft. from various size charges.



Note:–Downward deflection from base line indicates compression. Upward deflection from base line indicates tension.

Fig. 2—Examples of strain-time wave pulses for 24-lb. charges at various distances from shot point.

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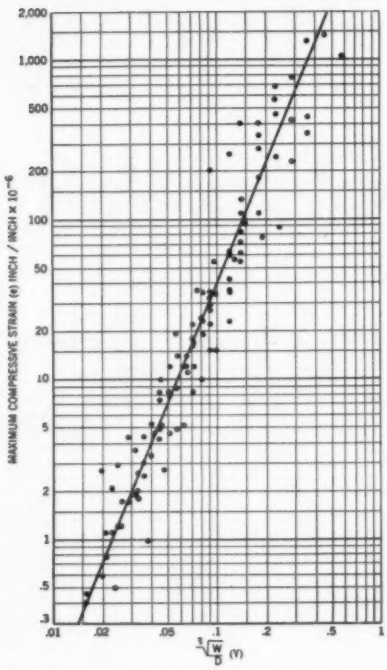


Fig. 3—Correlations of strain with charge size and travel distance, series 1 tests.

site are similar to those of some oil sands. Another feature of the site is that two other sandstones suited for experiment occur immediately below the Homewood. All three are members of the Pottsville group of lower Pennsylvanian age.

Series 1

The first series of tests employed a linear array of eight 3-in. drill holes. The procedure followed was to detonate eight successively larger charges in each of shot holes 39, 38, 37, and 36 and to obtain records from four strain gages cemented into holes 35, 34, 33, and 32. In this test, strain vs. time records were obtained covering the range of charge sizes from 0.75 to 96 lb. of ammonia gelatin dynamite and gage to shot point distances from 5 to 75 ft.

Examples of strain vs. time records are shown in Figs. 1 and 2. In the strain record, a downward deflection indicates compression and an upward deflection, tension. The magnitude of the strain is computed by multiplying the amplitude of the pulse, measured from the base line, by the sensitivity factor of the recording equipment. Time on the records increases from left to right—a distance of 1 cm. is equal to 0.0005 second.

Certain characteristics of the strain wave pulses are evident from the records. In Fig. 5 (charge size constant; travel distance variable), the broadening of the strain pulse with increasing distance is attributed to the absorption by the rock of the higher frequency components of the strain wave pulse. The records in Fig. 6 (travel distance constant; charge size variable) show the slope of the strain wave front increasing with the charge size, indicating a shock-wave effect.

The measured peak compressive

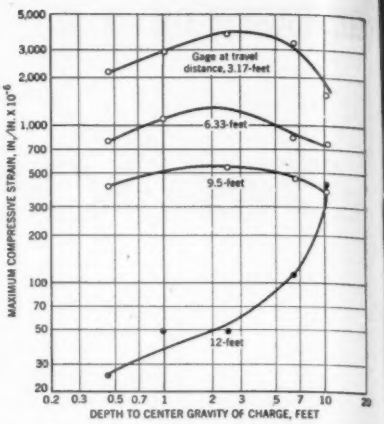


Fig. 5—Plot of maximum compressive strains measured in series 2 tests vs. charge depth.

strains data from Series 1 are plotted in Fig. 3 against the quantity:

$$Y = 3/w/D$$

where

w = charge size, in pounds.
D = distance from shot, in feet.

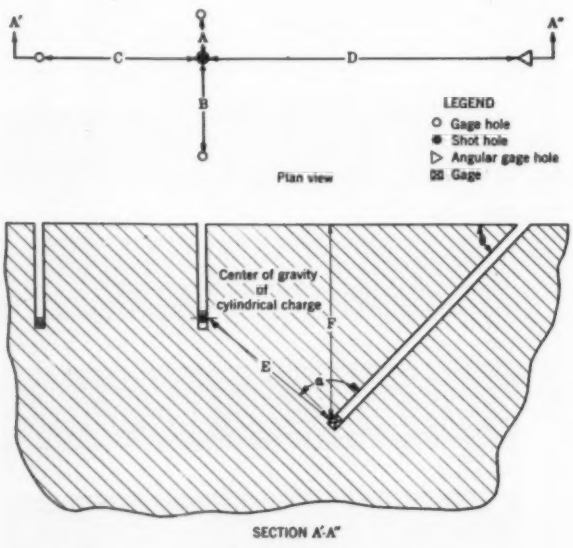
The data between strain, charge size, and distance shown in Fig. 3 can be expressed by the formula:

$$e = k\,Y^n$$

where

e = maximum compressive strain, micro-inches per inch.
k = 12,000.
n = 5/2.

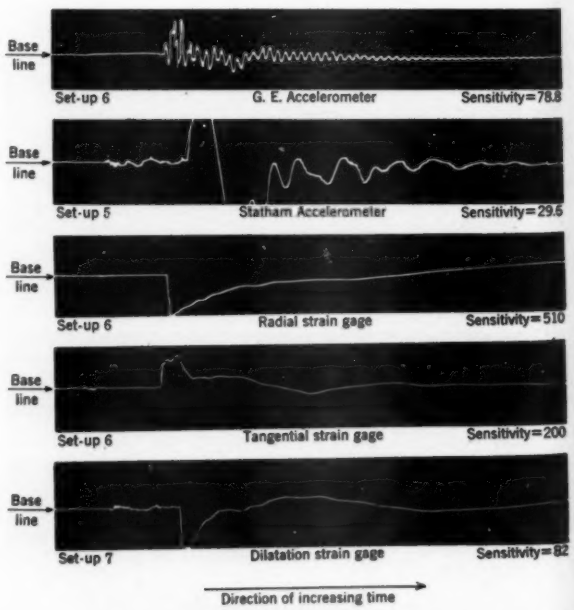
The value of the constant k is equal to the compressive strain at unit dis-



Set-up numbers

	9	10	11	12	13
A	3.16	3.05	3.14	3.13	3.18
B	6.28	6.35	6.30	6.22	6.45
C	9.62	9.65	9.40	9.60	9.40
D	20.30	19.50	17.55	15.97	12.73
E	13.59	12.80	12.75	13.20	12.73
F	11.32	10.65	9.74	10.86	10.31
θ	43° 22′	45° 01′	54° 56′	74° 03′	90° 00′
a	85° 40′	87° 08′	91° 02′	93° 18′	90° 00′

Fig. 4—Typical plan and section views of a series 2 setup.



Note:-Downward deflection from base line indicates compression or negative acceleration. Upward deflection from base line indicates tension or positive acceleration.

Fig. 6—Sample records obtained from different types of gages used in series 3 tests.

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★OLD DUTCH REFINING CO. Muskegon, Mich.	UOP Platformer 1,500 bbl /day	UOP Panellit
PAN AM SOUTHERN CORP. El Dorado, Ark.	Delayed coker 9,300 bbl./day	Lummus G.E
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STANDARD OIL CO. (OHIO) Lima, Ohio	Dist. 9,000 bbl. /day Lube 3,500 bbl. /day	Lummus G. E.-Sohio
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★WOOD RIVER OIL & REF CO. Hartford, Ill	UOP Fluid cat. 7,500 bbl./day	UOP Panellit

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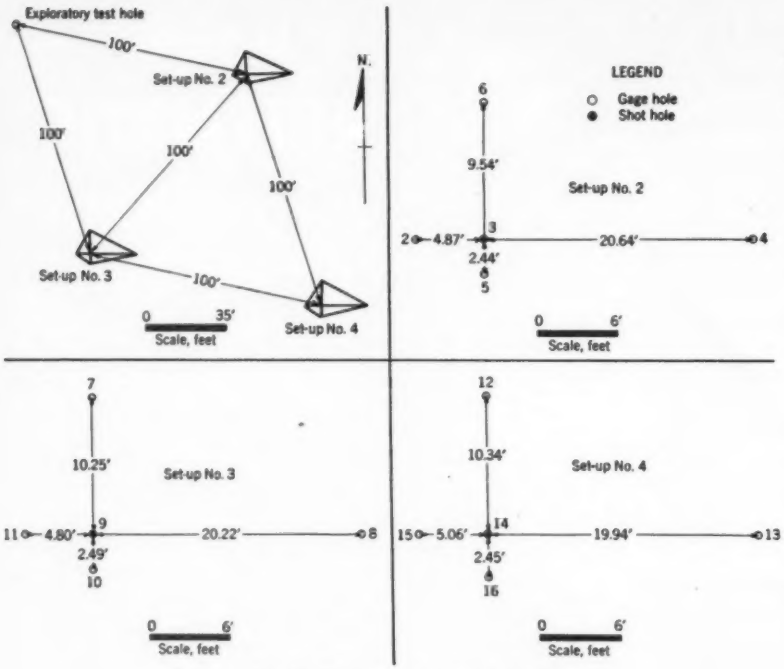

Fig. 7—Plan of series 4 test site.

tance from a unit charge. For a given explosive, fired under the same conditions in different rocks, constants k and n are characteristic of the rock type. On the other hand, for a given type of rock, these constants depend on the type of explosive and the conditions under which it is fired. Thus, this type of test should be satisfactory for comparison of explosives or differences in controllable shooting procedures.

Series 2

The second series of tests was designed to study the breaking characteristics of the Homewood sandstone and to relate these characteristics of failure with the strain produced in the rock. Five groups of holes were drilled in an area cleared of overburden. Fig. 4 shows the arrangement and gives the depths of gage and shot holes. Depths of the 6-in. diameter shot holes varied from 0.67 to 10.67 ft. Each hole was shot with 8 lb. of 60 per cent ammonium gelatin dynamite tamped into the bottom of the hole to form a cylinder 6 in. in diameter and 6 in. long. Each shot was stemmed to the surface with damp sand.

Fig. 5 is a plot of the peak compressive strains (measured at each of the four gage points) against the depth of burial of the charge. It will be noted that the data from the three radial gages mounted in the horizontal plane through the center of gravity of the charge show that the maximum strain was developed at a depth of burial equal to 2.5 ft. The decrease in strain as the depth of burial was decreased implies that a minimum amount of stemming is necessary to permit the maximum explosion pressure possible to be developed by the charge. The reason for the decrease in strain as the depth of burial was increased beyond 2.5 ft. is not known; however, this effect has been noted by another observer.[2] The cause of both effects needs further experimental investigation. Although the surface area was irregular, showed numerous weathering cracks, and a hardening of the surface, examination of the craters produced indicated that the type of failure was not influenced by these factors.

Series 3

This series of tests was run to compare the characteristics of three types of strain gages and two types of accelerometers. Three identical groups of holes (four gage holes equally spaced around a central shot hole) were drilled for these tests. Each shot hole was loaded with 9.75 lb. of 60 per cent ammonia dynamite, stemmed, and fired.

Sample records of the wave pulses recorded from the radial, tangential, and dilatation types of strain gages, and a General Electric and a Statham accelerometer are shown in Fig. 6. From these records it is evident that the three types of strain gages recorded pulses similar to their general characteristics and are considered satisfactory for quantitative measurement. The accelerometers show evidence of extraneous vibrations of unknown origin. Further laboratory testing will be necessary before these gages can be adapted for field experimentation.

Series 4

The fourth series of tests was made to develop a technique for instrumenting water injection tests so that the intensity of the shot, as measured by strain gages, could be correlated with changes in fluid conductivity produced by the shot. To establish the range of effect between "low" and "high"-powered explosives, a 40 per cent nitroglycerin dynamite, liquid and solidified nitroglycerin were used in the tests.

Three identical groups of five vertical, 3-in. holes each were drilled for these tests, as shown in Fig. 7. The gage holes were approximately 2.5, 5, 10, and 20 ft. from the shot holes. Fig. 8 gives the north-south cross-

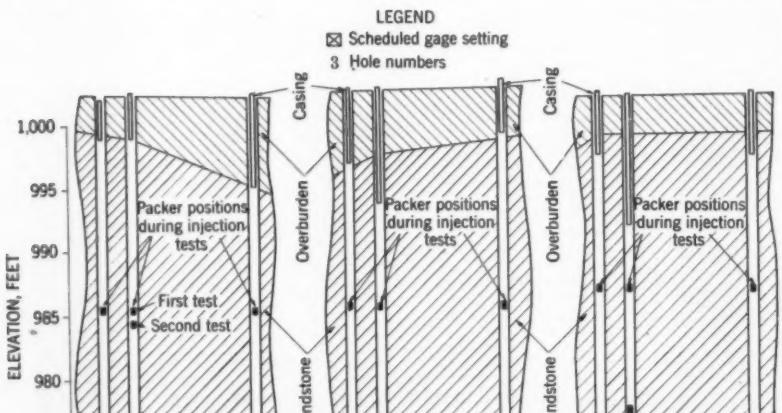

Fig. 8—North-south sections through series 4 setups.

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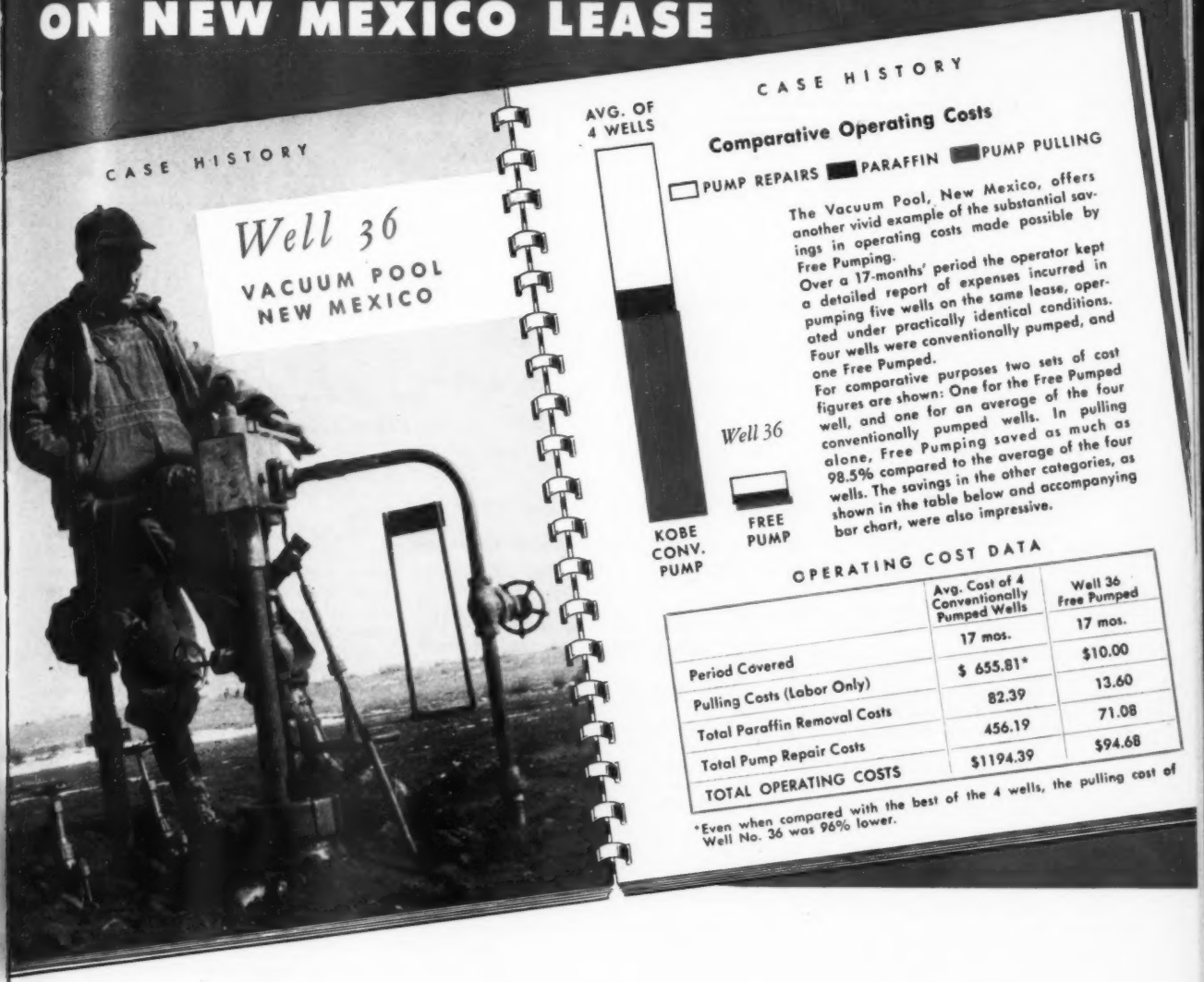
CASE HISTORY
Well 36
VACUUM POOL
NEW MEXICO
CASE HISTORY
Comparative Operating Costs
AVG. OF 4 WELLS
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OPERATING COST DATA

	Avg. Cost of 4 Conventionally Pumped Wells	Well 36 Free Pumped
Period Covered	17 mos.	17 mos.
Pulling Costs (Labor Only)	$ 655.81*	$10.00
Total Paraffin Removal Costs	82.39	13.60
Total Pump Repair Costs	456.19	71.08
TOTAL OPERATING COSTS	$1194.39	$94.68

*Even when compared with the best of the 4 wells, the pulling cost of Well No. 36 was 96% lower.

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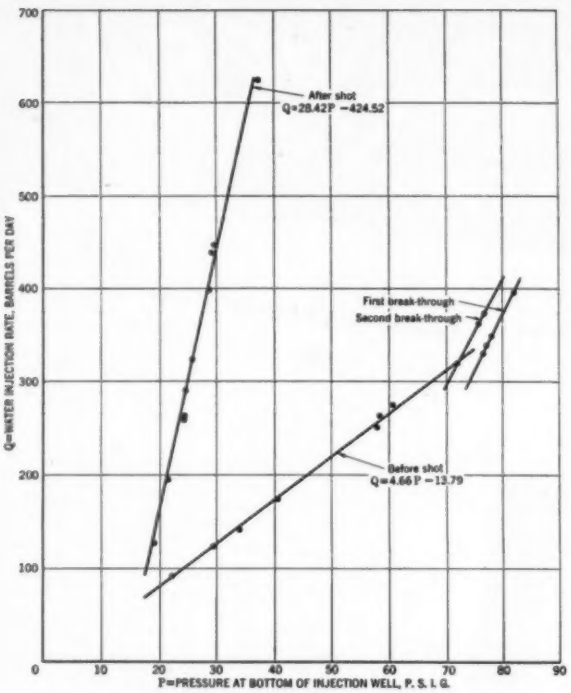


Fig. 9—Water injection test, setup 2, hole 3.

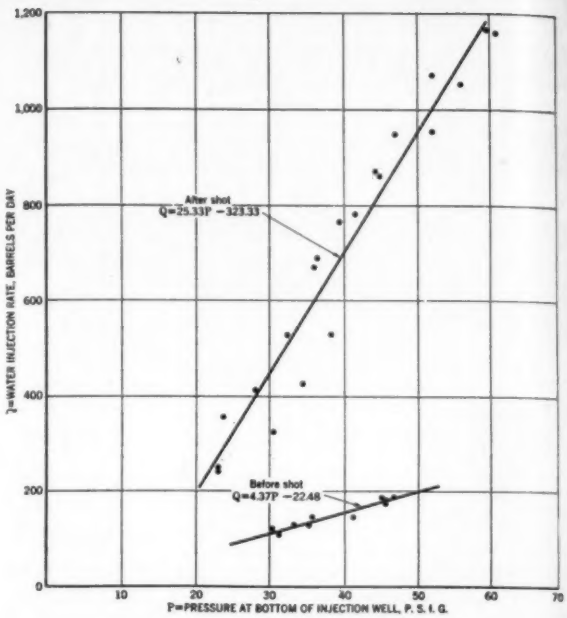

After shot
Q=25.33P −323.33
Before shot
Q=4.37P −22.48
Q=WATER INJECTION RATE, BARRELS PER DAY
P=PRESSURE AT BOTTOM OF INJECTION WELL, P. S. I. G.

Fig. 10—Water injection test, setup 3, hole 9.

sections through the three groups of holes, showing the positions of the charge and of the gages, and the vertical sections of the shot holes into which water was injected.

The test procedure was as follows: Water-injection tests were made in each shot hole to determine its injectivity index. Next, an attempt was made to cement the gages into the gage holes; however, the previously injected water had not drained from the area as expected, and considerable difficulty was experienced. The explosive charges were placed in the holes in 2½-in. diameter shells 6 ft. in length. The charges used were as follows:

Hole 3—15.3 lb.—40 per cent nitroglycerin dynamite.

Hole 9—20.0 lb.—liquid nitroglycerin (white).

Hole 10—17.75 lb.—solidified nitroglycerin.

Four feet of the hole above the bridge over the charge was filled with sand. The charges were then fired, and the resulting strain waves recorded. Finally a second series of water-injection tests were made on the holes.

The shots blew 3 of the 12 gages from their holes. Also only four of the remaining gages produced strain records. Because of these evidences of faulty cementing, no interpretation was given to the four records obtained.

The procedure used in making the water-injection tests followed previously developed techniques for determining the injectivity indices of water-injection wells.[4] Water was injected at a constant rate until the well-head pressure varied less than 5 per cent over a 12-hour period before any measurements were made. Thereafter, the rate was increased or decreased stepwise, with each test rate maintained until the pressure had remained constant for 2 hours before the rate and pressure were recorded. The injection data are presented graphically in Figs. 9, 10, and 11 and are summarized in Table 1.

Changes in slope of the injection-rate vs. pressure curves were found in tests on Holes 3 and 14 before shooting. These "break throughs" occurred at 72 and 42 psi., respectively. In each case, the slope of the curve above the break-through pressure was

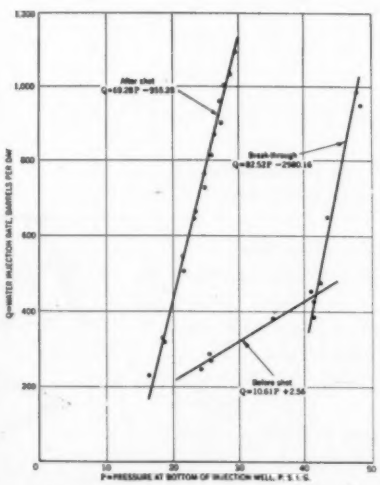


Fig. 11—Water injection test, setup 4, hole 14.

equal approximately to the slope of the curve obtained after shooting the hole.

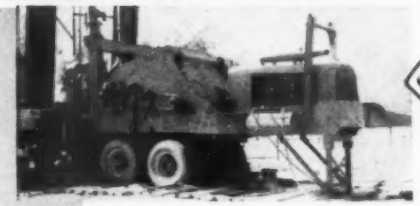
The type of fracturing that resulted from the experimental shots has not been determined because the water level over the area is too high to permit surveys of the holes with a borescope.

It is evident that the results of the Series 4 tests were unsatisfactory from the standpoint of developing correlations between the shot and the change in the injectivity index. However, the experience gained from these tests indicates that correlations can be expected by conducting the test on thinner sand sections at greater depths (100 to 150 ft.), using smaller-diameter holes and smaller charges and strain gages that can be mounted in water-filled holes.

Survey of Physical Properties of Oil and Gas-Reservoir Rocks

The physical properties of the oil and gas-bearing reservoir rocks are needed to determine the range of properties that must be considered, in the experimental program and to relate the results of this program to the shooting of wells from producing areas. A series of standardized laboratory tests has been developed to determine from core samples the strength and elastic properties of rock.[5] With the cooperation of the industry, numerous oil-formation cores have been obtained and are being subjected to these routine physical property tests. Additional cores are being solicited to make the survey cover, as completely as possible, every type of oil or gas-bearing rock. Physical properties of the Homewood sandstone from the Series 3 and 4 test sites and of a Bartlesville sand-

Sure, THERE IS A REASON



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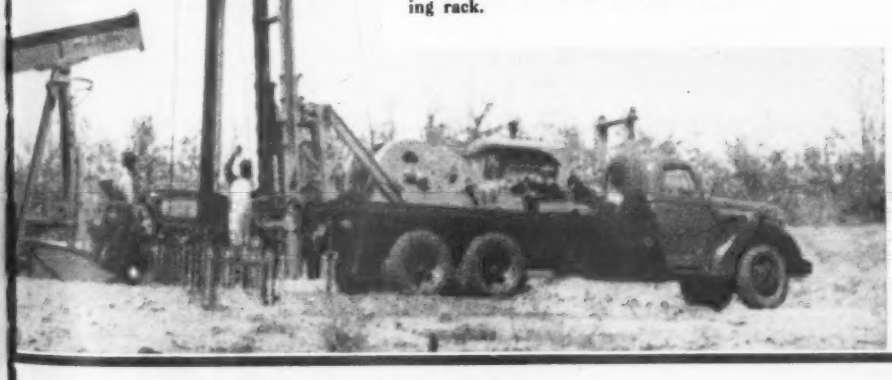

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TABLE 1—SUMMARY OF WATER INJECTION AND SHOT DATA, SERIES 4 TESTS

	Radius of hole (ft.)	Length of section tested (ft.)	Amount of water injected during test (bbl.)	Formation pressure at time of test (psi.)	Equation of injection rate vs. pressure curve Q = rate, bbl. per day; P = bottom-hole pressure (psi.)	Pressure at which slope changed (psi.)	Injectivity index, bbl. per day per psi. per foot of sand	Increase in injectivity index (per cent)
Hole 3*—Setup 2								
Before shot	0.125	15	390	0	Q = 4.66 P — 13.79	72	0.31	...
After shot	†13.0	14	2,954	‡14.9	Q = 28.42 P — 424.52	..	2.03	555
Hole 9§—Setup 3								
Before shot	0.125	15	546	0	Q = 4.37 P — 22.48	..	0.29	...
After shot	†11.7	15	3,685	‡12.8	Q = 25.33 P — 323.33	..	1.69	483
Hole 14¶—Setup 4								
Before shot	0.125	15	835	0	Q = 10.61 P + 2.56	42	0.71	...
Before shot	0.125	15	835	0	Q = 82.52 P — 2,980.16	..	5.50	675
After shot	†12.9	15	5,452	‡13.8	Q = 69.28 P — 955.28	..	4.62	550

*Hole 3 shot with 15.3 lb. 40 per cent nitroglycerin dynamite loaded 2.55 lb. per ft. in 2½-in. by 6-ft. shell.
†Calculated by assuming $r_e = 30$ ft. and solving for r_w in radial flow formula:

$$Q = 0.003076 \times \frac{kh\,(P_e - P_w)}{u \log^{10} r_e/r_w}$$

where:
Q = rate, bbl. per day
k = permeability, md.
h = sand thickness, ft.
u = viscosity, cp.
r_e = external radius, ft.
r_w = well radius, ft.
P_e = external pressure, psi.
P_w = well pressure, psi.

‡Calculated from intercept of curve obtained after shooting.
§Hole 9 shot with 20.0 lb. liquid nitroglycerin (white) loaded 3.33 lb. per ft. in 2½-in. by 6-ft. shell.
¶Hole 14 shot with 17.75 lb. solidified nitroglycerin loaded 2.96 lb. per ft. in 2½-in. by 6 ft. shell.

TABLE 2—EXAMPLES OF PHYSICAL PROPERTY DATA FROM TESTS ON CORE SAMPLES

	Homewood sandstone* average value	Bartlesville sandstone† average value
Apparent specific gravity	2.18	2.25
Apparent porosity, per cent	11	8.0
Compressive strength, psi.	12,200	11,200
Modulus of rupture, psi.	980	1,200
Impact toughness, in. per sq. in.	2.6	2.4
Elastic constants (dynamic method):		
Young's modulus, psi.	1.51×10^6	(‡)
Modulus of rigidity, psi.	0.80×10^6	(‡)
Specific damping capacity	0.10	(‡)
Apparent Poisson's ratio	0.06	(‡)
Longitudinal bar velocity, ft. per sec.	7,160	(‡)
Elastic constants (static method)—Young's modulus, psi. (secant value):		
At 1,300 psi.	1.39×10^6	§1.21×10^6
At 3,800 psi.	2.09×10^6	¶2.32×10^6
At 7,700 psi.	2.57×10^6	‖2.51×10^6
Poisson's ratio:		
At 1,300 psi.	0.06	§0.10
At 3,800 psi.	0.12	¶0.18
At 7,700 psi.	0.23	‖0.62
Hardness:		
Scleroscope, scleroscope units	29	27
Abrasive (rev. × sq. in. × 10^{-3})/lb.	3.9	3.2

*Cores from test sites 3 and 4, Seifer farm, Sandy Creek Township, Venango County, Pennsylvania. †Cores from well in Township 27n-12e, Washington County, Oklahoma. ‡Length of available core samples insufficient for test. §At 1,200 psi. ¶At 4,300 psi. ‖At 8,500 psi.

stone core from Washington County, Oklahoma, are given in Table 2.

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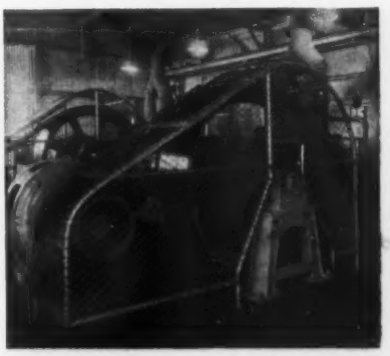
Safety Guard for Driving Pulley

THE large 6-ft. driving pulley and flat V-belt drive shown in photo required guard protection. At the same time, however, it was necessary frequently to have access to the belt-drive group. To provide this ease of access and at the same time give adequate protection to maintenance men, the guard shown was fabricated.

The frame is made of welded 2-in. pipe fitted with chain-link fencing material. The heavy guard thus formed is made portable by adding casters to the bottoms of the supporting legs so that it can easily be rolled out of the way when it becomes necessary to work on either the engine or generator. The installation is in use at Magnolia Petroleum Co.'s Mamou, La., light-plant building.



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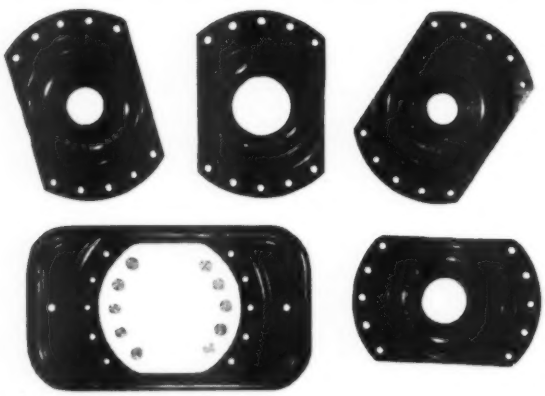
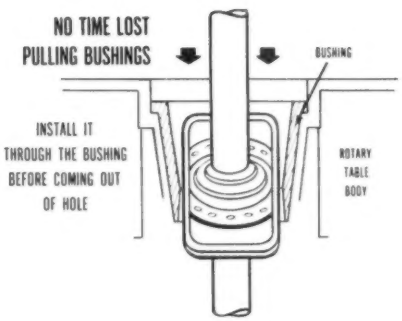
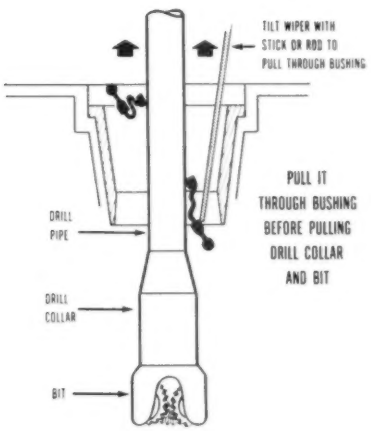


Buy one body for each rig — buy an insert for each pipe size and replace only the inserts when they wear.





The FLEX-LIP PIPE WIPER was designed to provide a pipe wiper that would give longer life at less cost and greater operating convenience than any other pipe wiper available today. In fact, we believe that FLEX-LIP offers the first real improvement in pipe wiper design and construction since this method of cleaning pipe was introduced.

The FLEX-LIP PIPE WIPER principle is as simple and logical as the practice of making automobile tires replaceable on wheels. When the part that takes abuse is worn out, you simply replace that part at far less cost than the replacement cost of the entire unit. The balanced design of FLEX-LIP PIPE WIPERS enables you to do this with your pipe wipers. The long life body can be made tougher and stronger than conventional pipe wipers because it does not contact the pipe. The replaceable accordion insert can be made more resilient with greater snap-back than conventional pipe wipers because its only job is to grip and wipe the pipe.

Exhaustive laboratory and field testing have proved the economy, long-life and time saving features of FLEX-LIP PIPE WIPERS. They are available now through your supply stores or write for prices and complete information.

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One body size fits all pipe or rotary sizes on any rig . . . Buy only the low cost replacement inserts for different pipe sizes.

2. FLOATING ACTION

The Flex-Lip design allows wiper to follow pipe on any off-center condition. Pipe weave does not affect wiping action. It wipes in any position under the rotary and the accordion action passes drill pipe protectors without excessive drag.

3. TIME SAVING

It is easy to install or remove. You do not have to pull bushings before starting out of hole.

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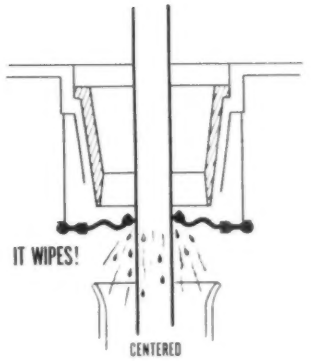
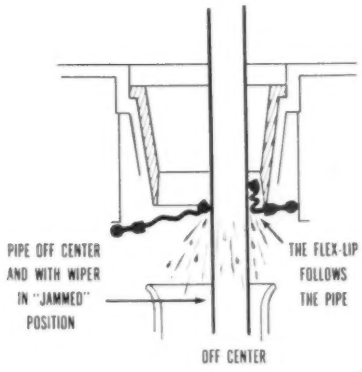
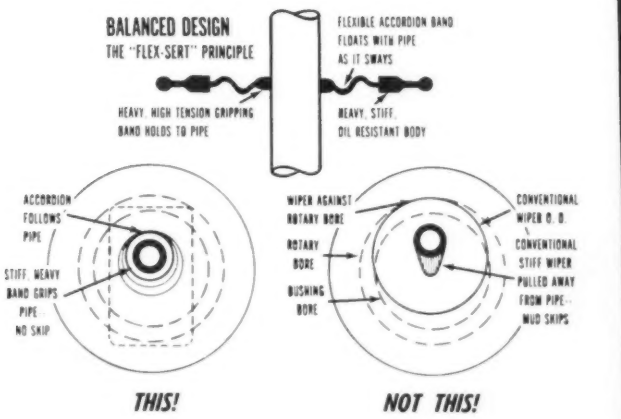
The oil resistant body is made of tough material with strength, stiffness and durability. The Flex-Lip inserts are made of materials with fast snap-back and high tensile strength to grip and follow pipe movement.





PATENTS PENDING


BALANCED DESIGN
THE "FLEX-SERT" PRINCIPLE
FLEXIBLE ACCORDION BAND FLOATS WITH PIPE AS IT SWAYS
HEAVY, HIGH TENSION GRIPPING BAND HOLDS TO PIPE
HEAVY, STIFF, OIL RESISTANT BODY
ACCORDION FOLLOWS PIPE
STIFF, HEAVY BAND GRIPS PIPE NO SKIP
WIPER AGAINST ROTARY BORE
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Design of

CATHODIC PROTECTION FOR OPEN-BOX-TYPE COOLERS

by C. R. Draughon, Jr., and E. B. McNeil*

AT the Baton Rouge refinery of Esso Standard Oil Co. an attempt is being made to retard or prevent water-side corrosion in open-box coil coolers by the use of cathodic protection, and thus to reduce the high maintenance costs on this type of cooling equipment. Also it is anticipated that replacements can be deferred for a considerable length of time, and that the extensive use of high-cost alloy steel can be avoided. The general scheme of a typical open-box cooler is shown in Fig. 1.

Through February 1950, three open-box coil-type coolers have been protected. The first was of an experimental nature, wherein the cost was relatively high for the protection obtained; but sufficient design data were obtained to enable providing more adequate protection for less unit cost on the next two installations. Recirculated cooling-tower water and raw Mississippi River water are the two types of coolants used at Baton Rouge, and their analyses are shown in Fig. 2.

Corrosion on the water side of the tubes has been in the form of tubercules, which resulted in deep pitting and short life. It is estimated that the average service life of a steel cooler coil in river-water service is about 3 years, but this varies to some extent with the operating temperature.

The pipe coils in one cooler had a service life of approximately 30 months, and the annual maintenance cost was estimated at $6,000—with complete replacement costing about $15,000. Several methods of corrosion control were considered along with cathodic protection. Of these, cathodic protection was favored because replacement would not be required, and because the initial and operating costs appeared to be low. In addition, it was considered desirable to determine whether cathodic protection was a practical method of corrosion control on this type of equipment.

*Esso Standard Oil Co., Louisiana division, Baton Rouge, La. Presented at mid-year meeting A.P.I., Refining Division, Cleveland, May 1950.

Initial Installation

The cooler selected for the initial cathodic-protection installation contains two carbon-steel coils—the coolant being well water, which is recirculated through a cooling tower. As shown in Fig. 3, this compartment contains a cooling-surface area of 5,440 sq. ft. and a box area of 2,156 sq. ft., or a total area of 7,596 sq. ft. requiring protection. When the installation was designed, there was little information available on the design of systems to protect open-box coolers. The meager data indicated that protection had been achieved with current densities anywhere from 1 to 8 ma. per square foot, and no water analyses were correlated with these data.

It was apparent from the start that there were two main problems, viz.: current density requirements, and current distribution. The data available formed the basis for an estimate that an average of about 3 ma. per square foot would be needed to give protection in water of our analysis, and that a potential change of 150 to 200 mv. was to be expected, but not much more.

Because of the experimental nature of the installation, it was decided to design on the basis of obtaining more protection that these estimates indicated would be needed. A total current capacity of 50 amp. was estimated to be necessary to protect the coils and the box, supplying an average of 6.6 ma. per square foot to the surface to be protected. The installation placed in service on this cooler consisted of the following features:

Rectifier.—The rectifier installed is a standard copper-oxide oil-immersed unit rated at 15 volts and 100 amp. maximum direct-current (d.c.) output. The 100-amp. rectifier was selected so that sufficient capacity would be available to protect a similar cooler coil and box adjacent to the one described herein.

Primary connection was for 440-volt, three-phase alternating current (a.c.). Control of the d.c. output was obtained by positive-contact link adjustment in 12 steps. A magnetic circuit breaker was used for electrical protection.

Anode system.—Inasmuch as it appeared that more effective protection could be obtained with a large anode surface and close anode spacing, a total of 104 flat steel-plate anodes was installed as shown in Fig. 4. Each anode was made of ⅜-in. plate, 12 in. wide, and 10½ ft. long, extending to within 6 in. of the bottom. A center-to-center spacing of 30 in. was

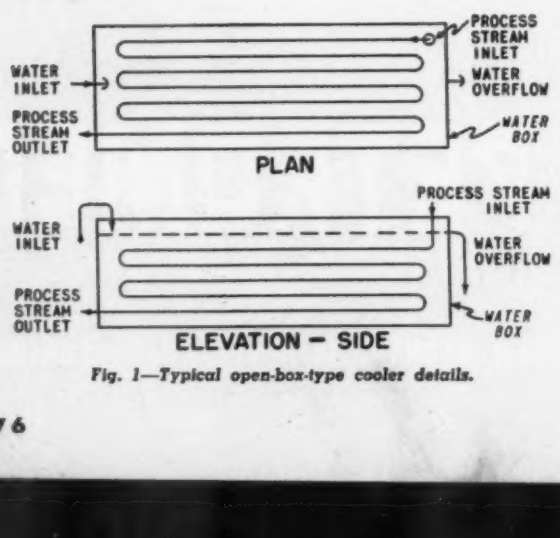

Fig. 1—Typical open-box-type cooler details.

		WELL WATER RECIRCULATED IN COOLING TOWER	RAW MISS. RIVER WATER
ppm	Total Alkalinity	254	90
	Total Hardness ($CaCO_3$)	24-30	90-115
	Total Solids	160-350	200-250
	Silica (SiO_2)	32	6
	Chlorides (NaCl)	48	40
	Sulphates (SO_4)	6	52
Turbidity		-	320
pH		8.9	8.0
Operating Temperature, °F		170-190	120-180
Specific Resistance, ohm-cm		560-1230	1040-1700

Fig. 2—Baton Rouge cooling-water characteristics.

maintained except where limited by physical conditions in the box, and a row of anodes was installed parallel to and between every other vertical bank of tubes.

Anode-current density was set at 30 ma. per square foot, and it was estimated that a life of about 4 years would result. Anodes were suspended from supports in the top of the box, which were constructed of wood and structural steel. The wood also served as electrical insulation between the positive side of the rectifier and the box, which was negative. Wooden positioners in the bottom of the box held the anodes from swaying.

Electrical system.—The details of the electrical system are given in Fig. 5. All d.c. leads were designed to permit only a negligible voltage drop, so that the rectifier voltage required could be held to a minimum. Current from the rectifier was supplied to bus bar, and from these to the anodes. Current was drained from each vertical bank of tubes to a main drain lead, which also drained the box wall.

The system was designed to provide electrical symmetry in both the anode and drain leads. Also a number of open-end leads were installed to permit a variety of experimental studies. All copper-to-steel connections were made by brazing.

Results of Protection

The unit has now been in continuous service for 21 months since protection was initially applied. During this operational period numerous surveys were made on the cooler box, and considerable data were accumulated. The surveys made consisted of pipe-to-water potential and current density measurements. All pipe-to-water potential measurements were made by the utilization of a calomel exploring electrode.

Current density surveys were made, and these used a probe consisting of a flat steel plate of small area which was connected into the protection circuit, together with a milliameter. The following is a summary of the data obtained on the protection unit during the 21-month period mentioned:

1. As indicated in Fig. 6, readings taken along the length of any particular pipe show that the potentials are lower at points opposite the center of the space between anodes than at points on the pipe or wall surface directly opposite the center of an anode. Although the curve shown has been plotted from spot readings, it was found from the data that potentials on the pipe averaged about 15 per cent lower between anodes than opposite anodes. Also, the distribution pattern was similar along the length of the pipe at any particular location.

2. Points of minimum protection are the box walls and corners, and the wall and coils in the center of the box where there are no anodes. This condition results from the lack of sufficient anodes to achieve satisfactory current distribution. In general, all areas of the coils where anodes were located were found to have high potentials. One exception to this was an area in the southeast portion of the compartment where an area of low potential was found. It was believed that this was due to an increased depolarizing action caused by vigorous agitation of the water which was noted in this location.

3. As seen in Fig. 7, a trend in the readings taken in a north-south direction indicates a decrease in the pipe-to-water potentials toward the south end of the compartment. This might be explained by the fact that the water in this area is at a somewhat higher temperature and circulates more rapidly—thus causing increased depolarizing action.

4. The potentials on the top of the coils were found, on the average, to be approximately 30 per cent higher than the potentials on the side of the pipe facing the anode, and 40 per cent higher than the potentials on the side of the pipe away from the anode. Although the curve in Fig. 7 indicates only spot readings, this trend can be seen easily.

Higher potentials on the top of the pipe can be attributed to a layer of scale which formed a protective coating at this point. Although it is present on the pipe tops without applied current, this precipitation of insoluble calcium carbonate and magnesium hydroxide is greatly increased when protection is applied.

Prior to the installation of cathodic protection, it was observed that the most severe pitting had occurred on the top third of all pipe. Presumably these areas were deprived of oxygen by the scale and sediment, and had suffered anodic discharge to adjacent cathodic areas (pipe side and bottom) which received a plentiful supply of oxygen from the water and, consequently, suffered less corrosive pitting.

5. With a total rectifier output of 40 amp., protection was achieved on approximately 65 per cent of the coil-and-box surface area. This current supplies an average current density of 5.3 ma. per square foot.

6. A greater improvement with time was shown in areas of minimum protection as compared with areas of maximum protection. This was true even though the total current applied decreased slightly. This could be attributed to a buildup in pro-

TUBES		RETURN BENDS		
Size	4-1/2" O. D.		Size	4-1/2" Nominal
Number	144		Number	144
Number Across	16	AREA of Tubes and Return Bends		5,440 sq. ft.
Number Down	9	BOX	Size	38' x 22' x 11'
Length	30'		Area	2,156 sq. ft.
		TOTAL AREA of Tubes and Box		7,596 sq. ft.

Fig. 3—Physical data on cooler box for Unit 1.

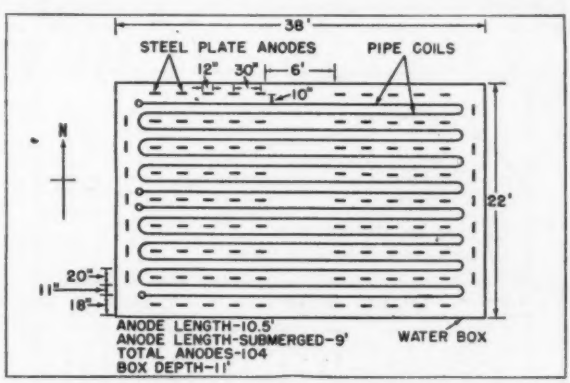

Fig. 4—Anode-arrangement details for protection of Unit 1.

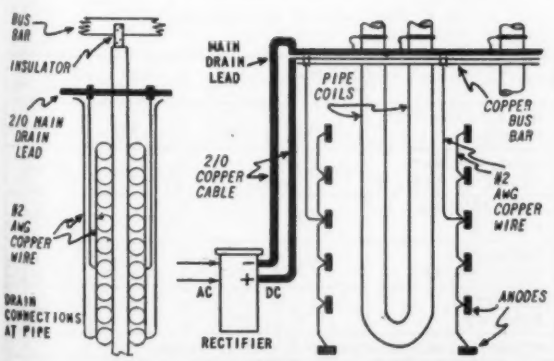

Fig. 5—Electrical details for protection of Unit 1.

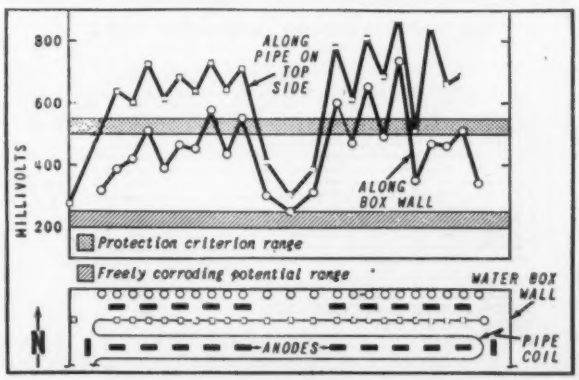

Fig. 6—Surface potentials along a pipe, Unit 1.

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tection of the cathodic areas initially which, as time progressed, was extended to less protected or anodic areas. The extent of this increase in protection was not sufficient to achieve the desired results even after the total current through the system had been increased.

7. Pipe-to-water potential could be increased by increasing the rectifier output, although not in proportion.

8. It was also found that potential readings on the bottom of the box were somewhat higher than those of the coils. This higher potential is caused by a protective scale on the box bottom. Measurements made at different levels in the box indicated that, although the potential varies as much as 15 per cent from the top coil to the bottom coil, no consistent variation in potential with depth had been noted.

9. To make a determination of the actual rate of corrosion with and without protection, carbon-steel samples were installed in the box. A total of six protected and six unprotected samples was placed in various locations.

The average pit penetration based on the estimated area attacked was observed to be from 0.02 to 0.005 in. per year on all of the samples, as compared to 0.15 in. per year on the coils as determined prior to the installation of protection. It was impossible to establish a definite relationship between the amount of corrosion on a sample, its location in the box, and whether it was protected.

Additions to Protection Unit

As a result of our surveys made during the initial period of protection, it was thought advisable that steps should be taken to achieve protection in the areas of low potential. It was decided to install additional anodes in the center portion of the coils and in the four corners of the box, and to increase the rectifier output to approximately 80 amp.—thus giving an average current density of 10 ma. per square foot.

The installation consisted of installing 31 anodes in the center of the coils and in the corners of the box. The anodes were graphite pipe, of 1 in. in outside diameter and ¾ in. in inside diameter. One anode was installed in each corner of the box, and three anodes were installed in each of the nine existing anode rows in the center of the coils. The additional anodes were connected in parallel to the existing electrical system. No additional drain leads were installed.

A survey of pipe-to-water potentials and current distribution indicated that increased protection has been afforded in areas of low potential and that greater protection has been offered in the high-potential areas. The area under protection has now been increased, so that 85 to 90 per cent of the box and coil is now receiving full protection. This was the result of better distribution through the use of additional anodes, and through an increase in rectifier output and current density. With adjustments in the electrical circuit, it is believed that the entire area can be brought under full protection.

This unit will be removed from service within a short time, and a complete inspection of the coils and box under protection will be made. Protection will have been applied for almost 2 years at this time, and it will be possible to determine whether cathodic protection has reduced the amount of corrosion. However, it may be brought out that the tubes were 2 years old at the time cathodic protection was provided—giving a total life of 4 years, as compared with an expected life of 2½ years without protection.

Protection of Other Cooler Boxes

Because of the favorable results obtained in the first installation, protection units were installed on two additional open-box coolers. Protection of these coolers resulted in a saving of more than $10,000 by the elimination of the necessity of replacing the two coils. Unit 2, costing $3,100, was placed in service in September 1949. In December of the same year, Unit 3, costing about $2,000, was completed and went into service. Both coolers are cooled with untreated Mississippi River water, and have an estimated service life of from 4 to 5 years without cathodic protection. Because the design for both units is similar, only the installation details of Unit 2 will be given. Physical data on the cooler are shown in Fig. 8.

Rectifier.—The rectifier is rated at 75 amp. and 12 volts d.c. output, and is a standard selenium oil-immersed unit, complete with a thermal overload relay, volt and ammeter, and power switch. This rectifier has a capacity slightly larger than design requirements of 60 amp., as this was the nearest size available without encountering undue delays in delivery. However, it provides excess capacity,

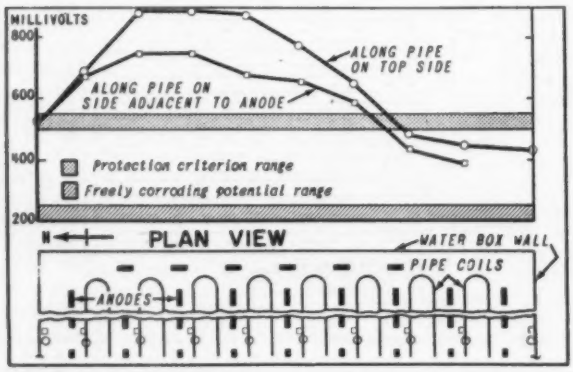

Fig. 7—Surface potential measurements, Unit 1.

TUBES		RETURN BENDS		
Size	4-1/2" O. D.		Size	4-1/2" Nominal
			Number	110
Number	121	AREA of Tubes and Return Bends		4,280 sq. ft.
Number Across	11	BOX	Size	36' x 12' x 9'
Number Down	11		Area	1,296 sq. ft.
Length	32'	TOTAL AREA of Tubes and Box		5,576 sq. ft.

Fig. 8—Physical data on cooler box for Unit 2.

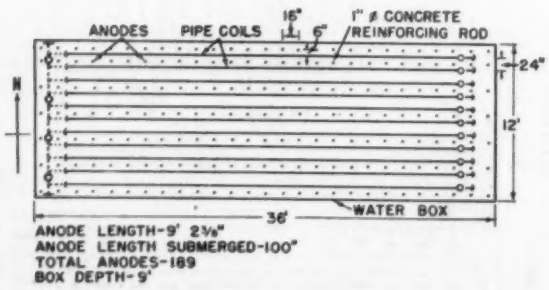

Fig. 9—Anode-arrangement details for protection of Unit 2.

	Unit No. I EXPERIMENTAL	Unit No. II	Unit No. III	Total For II and III
AREA PROTECTED, SQ. FT.	7,596	5,576	2,050	7,626
REPLACEMENT VALUE OF COIL, $	15,000	11,500	4,200	15,700
INSTALLATION COST, $	7,000	3,100	1,950	5,050
OPERATING COST, * $/YR.	96	36	10	46
UNIT COST, ¢/SQ. FT.	92.2	-	-	66.3

* Does not include replacement cost of anodes.

Fig. 10—Comparison of cathodic protection costs.

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A most livable patio, 33x35 feet, a large portion roofed over, flagstone floors, many beautiful hand carved stone pillars, large pine tree in center.

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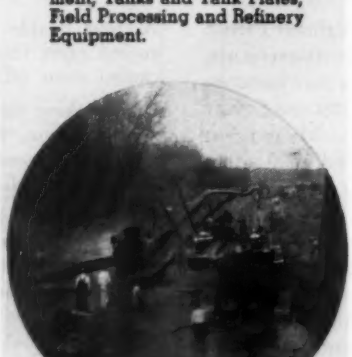

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which can be utilized if deemed desirable.

Anode system.—From our previous experience it was felt desirable to utilize cylindrical anodes placed closer together, instead of the flat plate, for the purpose of affording better distribution of current. Carbon steel was chosen as an anode material in order to reduce initial costs. Concrete reinforcing rods, 1 in. in diameter and 9 ft. 2⅜ in. in length, were utilized throughout—thus permitting rapid installation. Fig. 9 shows the anode arrangement. The spacing between anodes is 16 in., and the arrangement was designed so as to provide for an anode row between the outer row of tubes and sides of the box—thus assuring satisfactory protection for the box itself. There is a total of 189 anodes, each having an estimated life of 3 years.

Anode supports consisted of wood sleepers which held the lower end of each anode in place, and which also insulated the anodes electrically from the box bottom. The upper end of each anode was held by welding into a 2 by 2-in. angle running along the top of each anode row. Size 3 by 3-in. angles supported the anodes on the top of the box, and 3 by 4-in. timbers served to insulate the supports from the anodes.

D.c.-current leads.—All positive and negative leads were designed to permit only a negligible voltage drop, thus reducing the required rectifier-output voltage. This was particularly important in the negative leads in order to drain all current supplied to the system while at the same time preventing a portion from leaking off to adjoining structures. Insulated No. 00 AWG (American wire gage) stranded-copper cable was used for all main leads. Secondary leads utilized No. 4 AWG copper wire.

The upper anode-support structure, constructed of 2 by 2-in. angles, was also used for part of the positive-circuit in order to reduce construction costs and to eliminate the use of more expensive copper cable. In addition, more even distribution of current to the anodes resulted. The current-drainage system was simplified over that used in the previous installation. Each end of every two tubes was drained by bonding a negative lead to each return bend in the worm. The box was drained at six points—this bonding being done on the outside of the box, for convenience. Wherever possible, all electrical connections utilized thermite bonding.

Insulation.—All pipe lines to and from the cooler were insulated above-ground, using standard flange insulators. This was not done on the previous installation.

Results of Protection

There has not been sufficient time to make the desired detailed study of the last two installations since their

(Continued on page 82)

Methods for Estimating Octane Number

by H. D. Young*

Summarized here is a report on studies made by the laboratory methods group of the diesel-fuels division of the coordinating fuel and equipment research committee of the Coordinating Research Council, Inc. The study covers investigation of five indexes currently used for estimating the cetane number of diesel fuels.

As a result of the comparative study, a modification of calculated cetane number is proposed. This modification appears to give somewhat better accuracy in estimating the cetane number of a wide range of fuels between 15 and 85, and has been designated as the C.F.R. Calculated Cetane Index. An alignment chart, to permit convenient determination of index value from the A.P.I. gravity and midboiling point of a fuel, is included. From presentation made at fifteenth midyear meeting, A.P.I. Division of Refining, Cleveland.

A CONSIDERABLE number of empirical equations have been proposed for evaluating the ignition quality of diesel fuels ever since the need developed for such a determination. Most of the resulting indexes are based upon various physical properties of the fuel, namely gravity, volatility, viscosity, and aniline point, which reflect the fuel's chemical structure and thus, to a great extent, its ignition quality.

Irrespective of the fact that the most acceptable measure of the ignition property of a fuel is its performance in an engine cylinder under the prevailing pressure, temperature, and speed conditions encountered, these various indexes have found considerable usage in field and laboratory.

This particular study has been restricted to the evaluation of those indexes known to be in general use at the present time. They are:

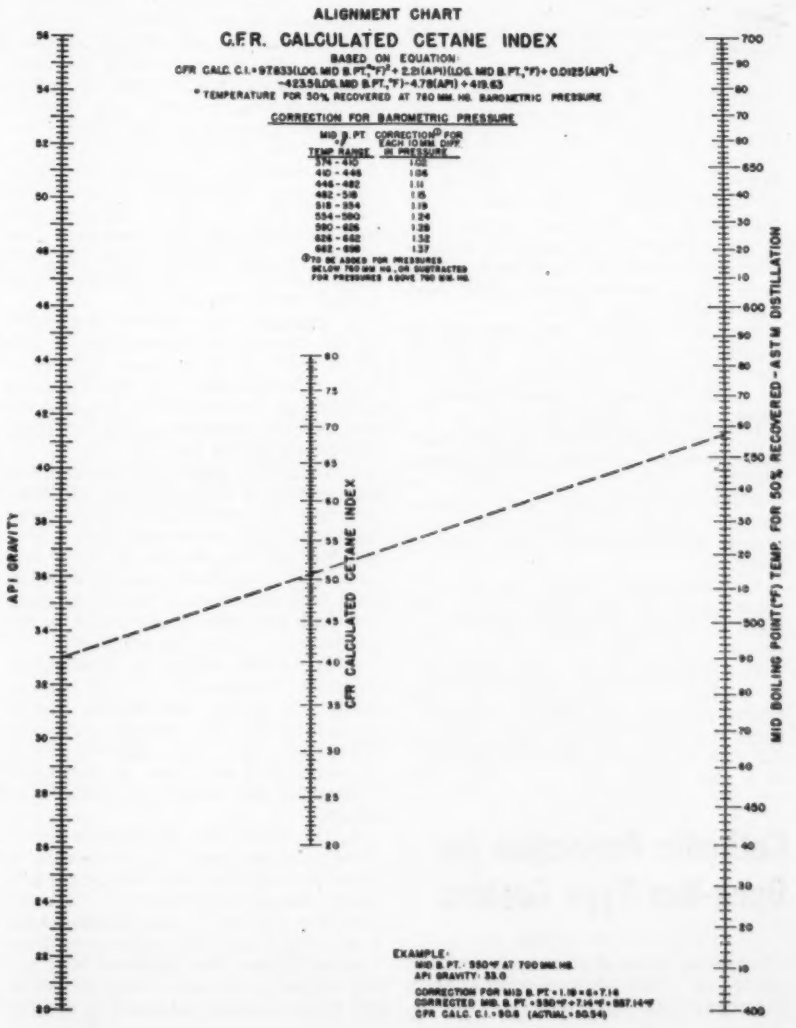
Diesel index
Calculated cetane number
Characterization factor
Ignition quality number
Modified ignition quality number.

Further reference to the origin of these indexes is to be found in the bibliography.

These indexes were evaluated from data supplied on 638 fuels, representing a variety of distillate products that may be classified as thermal cracked, catalytically cracked, and blends of straightrun and cracked fuels. Fuel types on which cetane numbers cannot be accurately estimated are those containing cetane number improvers, stocks produced by alkylation, certain Fischer-Tropsch fuels, coal-tar distillates, fuels high in aromatics, fuels high in unsaturates, and pure hydrocarbons.

The five indexes were evaluated principally on the basis of standard deviation of the data relative to A.S.T.M. cetane number, determined with and without regression. The analysis also includes a study of the accuracy of correlation of the calculated data with cetane number. From these basic data the following supplementary information was developed: (1) deviation of the data from A.S.T.M. cetane number as based on its breakdown into fuel type, (2) mean error of the data in relation to cetane number distribution, and (3) comparison of calculated values on A.S.T.M. National Diesel Exchange Fuels with their average cetane numbers as determined by approximately 20 laboratories.

The development of two modified indexes for estimating cetane number is an outgrowth of this study. Both of these indexes are based on the calculated cetane number equation as developed by the research division of the Esso Laboratories. One index is derived from the linear regression equation of the calculated cetane number, and the other from the curvilinear regression equation. Both modifications are believed to be an improvement over the original formula. However, that modification based on curvilinear regression appears to be most accurate over the full cetane number range of the fuels studied, i.e., 15-85. The standard deviation of the data using this modi-


ALIGNMENT CHART
C.F.R. CALCULATED CETANE INDEX
BASED ON EQUATION:
CFR CALC. C.I. = 97.833(LOG. MID B.PT.,°F)² + 2.31(API)(LOG. MID B.PT.,°F) + 0.0125(API)² − 423.55(LOG. MID B.PT.,°F) − 4.78(API) + 419.63
* TEMPERATURE FOR 50% RECOVERED AT 760 MM. HG. BAROMETRIC PRESSURE
CORRECTION FOR BAROMETRIC PRESSURE
MID B.PT. TEMP. RANGE
CORRECTION* FOR EACH 10 MM DIFF. IN PRESSURE
374 - 410 1.05
410 - 446 1.06
446 - 482 1.11
482 - 518 1.15
518 - 554 1.19
554 - 590 1.24
590 - 626 1.28
626 - 662 1.33
662 - 698 1.37
* TO BE ADDED FOR PRESSURES BELOW 760 MM HG., OR SUBTRACTED FOR PRESSURES ABOVE 760 MM. HG.
API GRAVITY
CFR CALCULATED CETANE INDEX
MID BOILING POINT (°F) TEMP. FOR 50% RECOVERED - ASTM DISTILLATION
EXAMPLE:
MID B. PT. - 550°F AT 700 MM. HG.
API GRAVITY: 33.0
CORRECTION FOR MID B. PT. = 1.19 + 6 = 7.19
CORRECTED MID. B. PT. = 550°F + 7.14°F = 557.14°F
CFR CALC. C.I. = 50.6 (ACTUAL = 50.94)

*Sinclair Refining Co., Harvey, Ill. Leader, C.F.R.-D.F.D., laboratory methods group.

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fication is 3.07 as against 3.40 for calculated cetane number.

It has been proposed by the diesel-fuels division of C.R.C. that this index be given consideration in lieu of calculated cetane number and that it be designated as: C.F.R. calculated cetane index. The equation of this index is as follows:

C.F.R. calculated cetane index = 97.833 (log midboiling point ° F.)^2 + 2.21 (A.P.I. gravity) (log midboiling point, ° F.) + 0.0125 (A.P.I. gravity)^2 — 423.5 (log midboiling point, ° F.) — 4.78 (A.P.I. gravity) + 419.63.

This complex equation has been adapted for practical use by means of the accompanying alignment chart. The A.S.T.M. cetane number of a fuel may be estimated directly from this chart by the temperature for 50 per cent recovered (A.S.T.M. distillation corrected to 760 mm. mercury barometric pressure) and the A.P.I. gravity.

It is emphasized that any index for estimating cetane number represents an average relationship established by a variety of fuels. It must therefore be kept in mind that, in the use of such an index, certain discrepancies between the estimated cetane number and A.S.T.M. cetane number may be expected.

Within the commercial diesel-fuel range of 40-60 cetane number, the expected accuracy of this index is close to 2 cetane numbers for 75 per cent of the fuels to which it is applied. For the range of cetane numbers above 60 roughly 50 per cent of the fuels will be estimated within ±4 cetane numbers. The index is particularly applicable to straightrun diesel fuels, catalytically cracked fuels, and blends of the two.

In using C.F.R. calculated cetane index for estimating A.S.T.M. cetane number, definite limitations exist in its application which must be recognized. These limitations are:

1. It is not applicable to fuels containing additives for increasing cetane number.

2. It is not applicable to pure hydrocarbons, synthetic fuels, fuels produced by alkylates, and coal-tar products.

3. Considerable inaccuracies may occur if it is applied to crude oil, residual fuels of below 400° F. end point.

The C.F.R. calculated cetane index is a tool for estimating A.S.T.M. cetane number. In view of its limitations, it cannot be substituted for the A.S.T.M. cetane number as determined in a test engine.

Cathodic Protection for Open-Box-Type Coolers

(Continued from page 80)

completion. Several surveys have been made on Unit 2 and preliminary measurements obtained on Unit 3. From the available data, the following results are known:

1. Complete protection of all portions of the coils and box on Unit 2 has been achieved with a total rectifier output of 60 amp., giving an average current density of 10.8 ma. per square foot. Initial measurements of protection of Unit 3 indicate similar results.

2. Distribution of current throughout all parts of the coil and box on Unit 2 is excellent, there being no areas of low potential. The ratio of minimum to maximum surface potential has been roughly established at between 80 and 85 per cent.

3. There is no great difference in potential between the top and bottom of the box.

4. Although potential values are different, the pattern of distribution is similar to that found previously.

5. The drainage system, although simplified, is ample.

Conclusions

As a result of 2 years of experimentation on cathodic protection of open-box coolers, it has been possible to draw the following conclusions:

1. Cathodic protection is an effective means of controlling corrosion on the complex structures of open-box-type coolers. Complete protection of the system involved can only be achieved through proper design and installation of the protection equipment. Although corrosion may continue after application of protective current, in a properly designed system this will take the form of a general metal loss instead of pitting, and will result in a greatly extended service life of the equipment.

2. Economically, cathodic protection of this type of equipment can be justified because it eliminates the necessity of replacement of the corroded equipment, or because it reduces the cost of maintenance repairs, or both. This is shown in Fig. 10.

3. To assure protection throughout any system, a sufficient current density must be maintained, and a large anode system with relatively close spacing between anodes must be had in order to distribute current equally. One will not suffice alone. A symmetrical distribution of current to the anodes should also be attained.

4. For water similar to that found at Baton Rouge, an average current density of 10 ma. per square foot is recommended for design purposes. Wherever vigorously agitated water is noted, this may not be sufficient because of the resulting depolarizing action.

5. The protection criterion used to determine the degree of protection in these installations has not been definitely established. However, to evaluate the success of the installations, a definite basis was necessary. Protection of the steel surfaces was assumed to have been obtained when the pipe-to-water potential in a freely corroding condition as referred to a saturated calomel electrode was increased negatively by 250 to 300 mv.

Use of Tubing As Drill Pipe

(Continued from page 56)

Early studies of lightweight alloy drill tubes, together with the indicated saving through the use of lightweight drilling equipment, led to the belief that exploitation wells could be drilled more economically by employing the same technique of lightweight equipment handling lightweight pipe. Subsequently, 12,000 ft. of 4½-in. o.d., 9.4-lb., 0.205-in. wall, 8740 steel Acme-thread upset tubing was purchased.

Since that time, nine wells have been drilled with this 4½-in. lightweight tubing. These wells ranged in depth from 3,650 to 6,150 ft. and the hole size included 8⅝, 9⅝, and one 11-in. hole. The footage drilled by these tubes to date totals about 40,000 ft., requiring 246 round trips.

Normal California techniques were employed insofar as table speed (50 to 300 r.p.m.) and weight on bottom (4,000 to 18,000 lb.) were concerned.

To date, 32 collars have been changed and two joints have been retired. The life remaining in the tubes is not known but physical inspection indicates that at present the tubes show no appreciable wear in the pipe or threads. No twistoffs have occurred, but while drilling one well the pipe became stuck owing to lost circulation and had to be shot off, leaving four singles, the drill collars, and the bit in the hole, which were later cemented and then sidetracked.

For comparative purposes the eight 4½-in. tubing-drilled wells have been divided into groups. In the first group of three (Fig. 12), it is possible to compare drilling progress to a depth of 5,135 ft. before noncomparable operations such as drill-stem tests or lost circulation occurred. The tubing-drilled wells reached this depth in the average time of 18½ days exclusive of rig-up time, whereas the average time for the conventional rig was 16 days.

If the first tubing-drilled hole (19 days), which experienced some mechanical trouble with the hoist, is eliminated, the average for the remaining two wells is 14 days; or in other words, the rate of penetration is comparable. The average daily operating cost for the tubing-drilled wells was $1,000 per day and the average cost per foot was $10.65, which is comparable to $1,152 per day and $12.16 per foot for the conventional rig.

The second group of four tubing-drilled wells (Fig. 13) is comparable only to a depth of 3,300 ft. The average time for the tubing-drilled wells was 8½ days whereas comparable

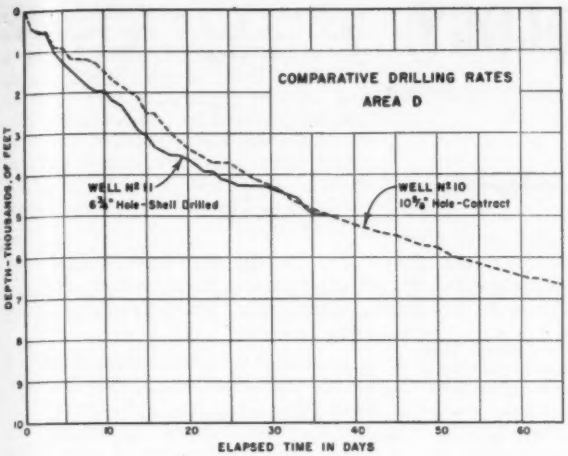

Fig. 10

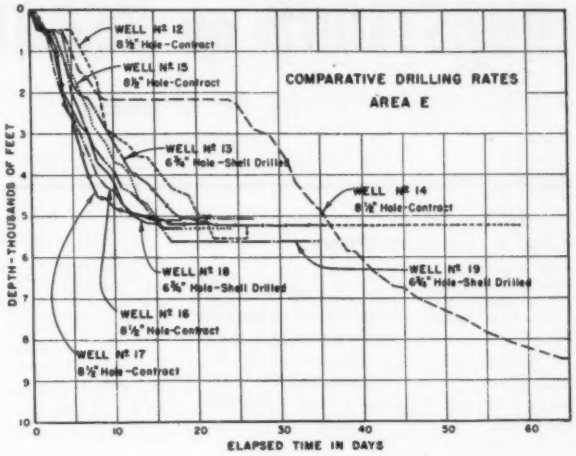

Fig. 11

conventionally drilled wells reached this depth in 9 days. Comparisons at greater depths in this group of wells cannot be made because of severe lost circulation encountered.

In judging these comparisons it must be recommended that all wells using 4½-in. tubing as drill pipe were drilled with a small rig having a 96-ft. mast and a 270-hp. diesel plant, whereas all wells drilled with drill pipe employed equipment pulling full 93-ft. stands and powered with a minimum of 700 hp.

In addition to the foregoing, we have used 2½-in., 6.5-lb. J-55 external upset tubing with Acme-type threads for completion purposes on 10 wells in Ventura Avenue field ranging in depth from 4,500 to 8,400 ft. After the 7-in. casing has been cemented at the top of the pay section, the tubing is made up and anywhere from 270 ft. to 1,050 ft. of new 6, 6⅛ or 6¼-in. hole drilled. The number of round trips ranged from 4 to 11 per well and included bit changes, shoe and formation testing, plugging, side-wall sampling, and liner hanging.

TABLE 2—RECAPITULATION OF COSTS OF WELLS DRILLED IN AREA "E"

Well No.	Hole size (in.)	Cost per foot (dollars)	Adjusted cost (dollars)	No. days aban-doning	Casing size (in.)	Contract or shell	Completion date	Tubing of drill pipe (in.)
Abandoned wells (no casing):								
18	6¾	5.48	5.65	*2	....	S	8-18-47	3½ T.
17	8½	10.68	11.40	*7	....	C	7-11-47	4½ D.P.
Abandoned wells (with casing):								
16	8½	14.09	14.70	*12	5½	C	6- 9-47	4½ D.P.
				No. days completing				
Completed wells:								
12	8½	20.05	25.10	36	5½	C	2- 5-46	4½ D.P.
13	6¾	10.48	12.95	12	4¾	S	10- 4-46	3½ T.
14	8½	14.44	15.13	23	5½	C	3- 3-47	4½ D.P.
15	8½	12.23	12.80	8	5½	C	4-25-47	4½ D.P.
19	6¾	9.94	9.94	17	4¾	S	10-12-47	3½ T.

*After reaching deepest depth.

TABLE 3—RECAPITULATION OF COSTS OF WELLS DRILLED IN AREAS "C" AND "D"

Area "C"	Depth (ft.)	Hole size (in.)	Cost per foot (dollars)	Adjusted cost per foot (dollars)	Contract or shell	Completion date	Tubing or drill pipe (in.)
Well 5	3,350	7⅞	13.07	15.24	S	12-29-46	3½ T.
Well 6	3,350	7⅞	9.03	10.28	S	1-14-47	3½ T.
Well 7	3,400	7⅞	8.39	9.83	S	1-28-47	3½ T.
Well 8	3,400	8½	10.41	11.25	C	4- 8-47	4½ D.P.
Well 9	3,500	8½	9.35	9.35	C	2- 2-48	4½ D.P.
Area "D"							
Well 10	7,006	8½	15.84	23.42	C	6-30-44	4½ D.P.
Well 11	5,000	6¾	10.61	10.61	S	6-13-47	3½ T.

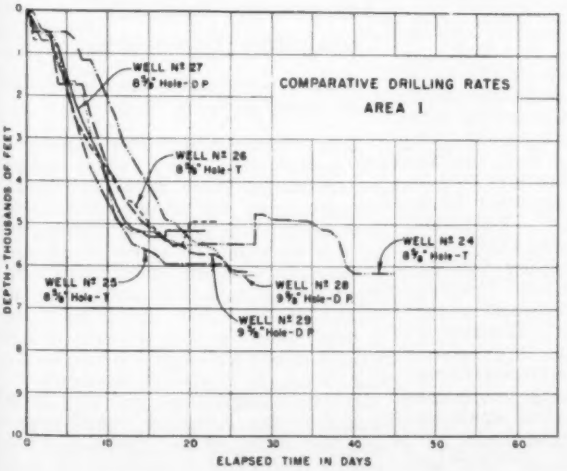

Fig. 12

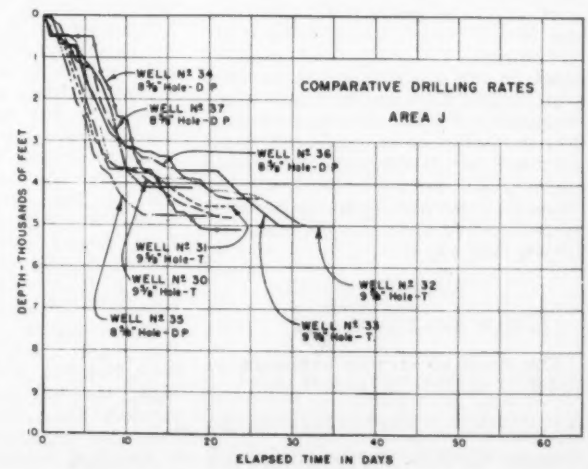

Fig. 13

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QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Outlet Temperature Of Stacks

Is the stack temperature equation given on the Refiner's Notebook page of March 29, 1947, correct or is the one given in the September 30, 1943, issue correct? Enclosed is a suggested derivation which, I believe, is rigorously correct.—J. G.

In the March 29, 1947, issue, the volume V is erroneously defined as the volume of gases measured at 60° F., whereas it should have stated the volume at the average stack temperature (about 540° F.). The rigorous derivation of J. G. (with some modifications) is:

$$Q = 3{,}600V \times 30/379 \times (T_1 - T_2)\ 0.26$$

$$= 74V\ (T_1 - T_2)$$

in which Q is the heat lost in B.t.u. per hour, V is the flue gas volume at 60° F., and T_1 and T_2 are the temperatures (°F.) respectively at the inlet and outlet of the stack.

The heat lost can also be stated in terms of the transfer rate:

$$Q = \frac{UA\ (T_1 - T_A) + (T_2 - T_A)}{2}$$

$$= \frac{UA\ (T_1 + T_2)}{2} - UA\ T_A$$

which involves only the assumption that the arithmetic mean temperature difference is reasonably correct (rather than the log mean temperature difference). The new symbols are: U, B.t.u. per sq. ft. per hour per °F. of temperature difference, air temperature T_A (°F.), and area of stack or chimney (A) in square feet.

In order to simplify the mathematics, the UA T_A term may be neglected. However, to retain as much accuracy as possible, the first term can be multiplied by about 0.9 because T_A (approximately 60) is about 10 per cent of $(T_1 + T_2) \div 2$ (approximately 600). Thus:

$$Q = (0.9/2)\ UA\ (T_1 + T_2)$$

$$Q = 0.45\ UA\ (T_1 + T_2)$$

The area (A) may be expressed in terms of height (H) as follows:

$$A = \pi H\ (V/v \times 4/\pi)^{1/2} = H\ (4\pi V/v)^{1/2}$$

where v is the velocity in feet per second for a temperature of 60° F.

By inserting the value of A from this equation, and by equating the two statements of the value of Q, we have:

$$\frac{T_2}{T_1} = \frac{82.2\ (V)^{1/2} - UH\ (\pi/v)^{1/2}}{82.2\ (V)^{1/2} + UH\ (\pi/v)^{1/2}}$$

or

$$\frac{T_2}{T_1} = \frac{46.3\ (vV)^{1/2} - UH}{46.3\ (vV)^{1/2} + UH}$$

The air temperature T_A, or more particularly the $(T_2 - T_A)$ and $(T_1 - T_A)$ terms are useful and hence they should, if possible, be introduced. The ratio of $(T_2 - T_A)/(T_1 - T_A)$ to T_2/T_1 ranges from only 1.09 to 1.15, and hence by using 1.117 as an average:

$$\frac{T_2 - T_A}{T_1 - T_A} = \frac{51.6\ (vV)^{1/2} - 1.117\ UH}{46.3\ (vV)^{1/2} + UH}$$

Fuel Oil Specifications

I am writing to request that you furnish me (any costs gladly paid) any material that will help me learn the fundamentals of fuel specifications. I have had no past experience with petroleum products.—W. J. L.

The two basic sources of fuel specifications are the American Society for Testing Materials, 1916 Race Street, Philadelphia 3, and the Western Petroleum Refiners Association, Hunt Building, Tulsa. A.S.T.M. Designation D396-48T describes the five grades of fuel oil now most widely marketed and the tests employed are described under other designation numbers in Petroleum Products and Lubricants (published yearly) also by the same organization. The W.P.R.A. keeps currently to date its Digest of State Tax Laws and State Specifications. The W.P.R.A. publication now also includes the provinces of Canada. The United States Navy and the Army also have specifications (VV-O-326 Oil; Fuel, Superintendent Documents, Washington, D. C.—7-0-2e Oil, Fuel, Diesel and 7-0-1g Oil, Fuel, Boiler, Bureau of Supplies and Accounts, Navy Department, Washington, D. C.). Finally, the scant specifications used in Platt's Oilgram or the yearly Platt's Oil Price Handbook, Nat. Pet. News publisher, Cleveland, indicate probably more accurately than the formal specifications, the requirements of trade.

Although specifications are undoubtedly necessary and useful, they are generally terse statements with little indication of the reasons for the values required. Accordingly, a real knowledge of fuel specifications and of the arguments that arise in marketing must be sought in the performance characteristics of the material. This is a complicated and unending study, but the following discussions in The Oil and Gas Journal will be helpful:

The Oil and Gas Journal

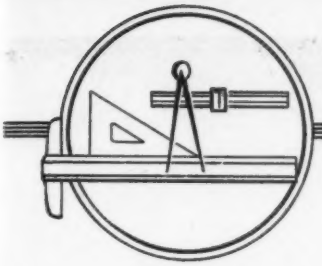
1. Diesel Fuel Performance, Refiner's Notebook No. 76, January 12, 1946, page 109.
2. Oil-Firing Temperature, Questions on Technology, August 24, 1946, page 92.
3. Fuel-Oil Tests, Questions on Technology, September 14, 1946, page 95.
4. Equivalent Heating Value of Refinery Fuels, Refiner's Notebook No. 114, October 12, 1946, page 111.
5. Fuel - Oil Properties, Refiner's Notebook No. 127, January 18, 1947, page 89.
6. Additives for Diesel Fuels, Questions on Technology, April 19, 1947, page 130.
7. Firing Oil, Refiner's Notebook No. 131, February 15, 1947, page 109.
8. Blending No. 5 and No. 6 Fuel Oil, Questions on Technology, September 15, 1949, page 133.
9. Fuel-Oil Additives, Questions on Technology, December 8, 1949, page 89.
10. How to Test Fuel-Oil Additives, Questions on Technology, January 26, 1950, page 355.
11. Viscosity of Residuum Blends, Questions on Technology, February 23, 1950, page 195.
12. Heating Value of Fuels Marketed Today, Questions on Technology, May 18, 1950, page 165.

In addition, some references are given on pages 66, 76, and 82 of the third edition of Petroleum Refinery Engineering, McGraw-Hill Book Co., Inc., New York, 1949.

Safeguards Against Crankcase Explosions

What can be done to prevent crankcase explosions?—W. F. G.

Explosions in large engines are not infrequent and they often cause severe burns. Some have been fatal. Oxygen may be present either by crankcase cover ventilator systems or it may be admitted as the crankcase cover plate or crank door is removed. Spark or ignition is thought to occur from localized hot spots such as a burned-out bearing, a stuck piston ring, a scored piston, or a frozen bushing. Thus, it is always advisable to allow the engine to cool for 10-20 minutes after shutdown before opening the cover plate. Obviously, the use of crankcase ventilation is bad practice.



ENGINEERING *fundamentals*

No. 406

Comparison of Permeability Distributions

IF the core data procured from a reservoir are regarded as being samples taken at random there is no particular reason to group these data in any specific order. For example, although permeability and porosity figures are usually reported as varying with depth, this is primarily a result of custom. The only physical basis for the representation versus depth is that depositional history may have produced such a variation. This, of course, cannot be demonstrated by a depth profile until the random variations have been examined. If the samples are presumed taken at random from a system where properties vary according to some distribution law, then a given permeability shows up at a given depth only by chance.

It is logical, from a statistics viewpoint, to group the porosity or permeability data in whatever fashion will illustrate the variation properly. For some engineering calculations it has been found convenient to use the cumulative frequency-type curve. This was discussed in Engineering Fundamentals No. 405. It is equivalent to an arrangement of the permeability samples in increasing or decreasing values rather than with depth. In addition to arranging in decreasing values, Stiles[3] has made use of permeability values as related to a standard reference.

Fig. 1 presents data representing a group of permeability profiles from a number of wells. The permeabilities have been arranged in decreasing order and plotted versus the number of samples. This curve is equivalent to the cumulative frequency curve turned sideways. In using this type curve for engineering calculations, it is generally regarded as being a continuous representation of one system. Thus the permeability distribution line in Fig. 1 is drawn to ignore the small variations noted when discussing it as a cumulative frequency curve. (Engineering Fundamentals No. 405.)

In place of these decreasing permeability values, Stiles[3] shows the use of decreasing permeability values which he arrives at by taking the "ratio of the actual permeability values to the average permeability of the formation." Expressing this ratio does not change the shape of the curve of Fig. 1. It merely places it on a different scale.

To permit comparing two different permeability variations it is convenient to plot this dimensionless permeability on the basis of the same number of samples every time. Therefore, the x-axis is converted to fraction of total samples. Thus each curve is plotted over the interval from 0 to 1.0.

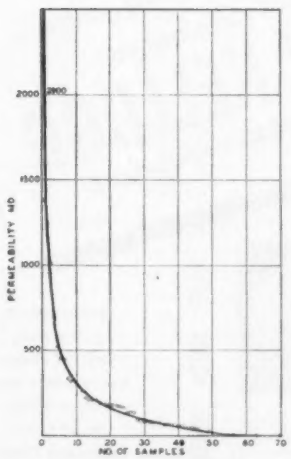
In Fig. 2 the data of Fig. 1 have been replotted, first by computing the average permeability, dividing it into each permeability value to obtain the dimensionless ratio, and plotting this ratio versus the number of samples divided by the total number of samples. It will be noted from Fig. 2 that plotting the data in this manner accentuates the small variations noted in Fig. 1, making it more apparent that perhaps this data comes from a formation where there are several types of permeability variation.

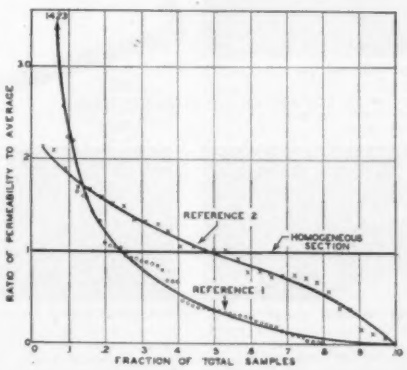
On Fig. 2 is also plotted another curve showing permeability data from a different source applying to samples taken from only one well. Also plotted on Fig. 2 is a straight line through the ratio value of unity. A completely homogeneous formation would plot up as this straight line. The comparison of the two curves with this line gives a clue to the degree of heterogeneity of the two formations. The data from Reference 2 appear to represent a system which is closer to homogeneity than that represented by the data in Reference 1.

Observations of this nature made on a particular permeability profile serve as a clue to interpreting flow behavior or producing behavior in those instances where permeability variations must be considered. Stiles[3] has made such an application to the calculation of water-flood performance, for example.

Fig. 1—(Left) Permeability data plotted in descending order. (Reference 1).

Fig. 2—(Below) Permeability ratio in descending order plotted versus cumulative fraction of samples.





References

1. Folger, Frank, M.S. Thesis, Univ. of Okla., 1949, Table 7.
2. U.S.B.M., R.I. 3715, p. 84.
3. Stiles, W. E., Use of Permeability Distribution in Water-Flood Calculations, Pet. Tech., Jan. 1949.

Series by Dr. John C. Calhoun, Jr., Chairman, Petroleum Engineering School, University of Oklahoma

XUM

A strange breed of "cat" ... cat-equipment, that is!

ONE of the unusual types of equipment Kellogg is frequently called upon to fabricate is the cat-poly reactor. A strange breed of heat exchanger, it is in reality a combination pressure vessel and heat exchanger, inasmuch as operating pressures in the catalyst-packed tubes reach 1200 psi. Another unusual aspect of these exchanger-vessels is that they are designed to be taken out of service regularly for replacement of catalyst, rather than being built to operate without maintenance for as long a period as possible.

Fabrication of this type of equipment is unusual, too, in the heat exchange field. First, it's on the "grand" scale, tubes being 5 inches in diameter and 40 feet long, and the shells 50 inches in diameter. But probably the most important single fabrication step is *the welding of the tubes to the tube sheets*, replacing the customary roll-in operation. Here Kellogg's unusually broad experience in welding techniques asserts its importance... guarantees the customer finished cat-poly reactors in the minimum time with the maximum service life built in.

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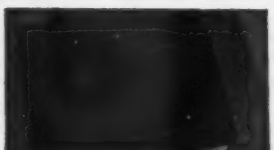
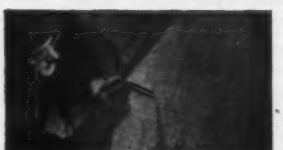


Continuing Basic Study of the principles of heat exchange conducted by Kellogg development groups for more than twenty years has produced unduplicated design data.



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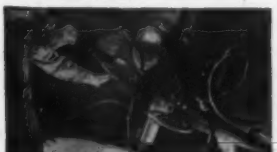

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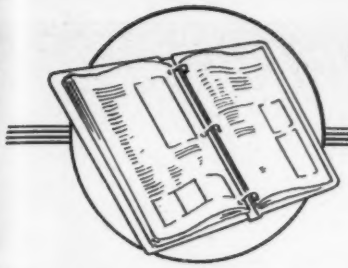

THE REFINER'S notebook

Control-Valve Pressure Drop

SIZING of control valves, as noted previously, can be simplified through the use of manufacturers' charts, tables, or slide rules. Some generalizations were made, concerning control valve flow rates, in last week's installment of the Refiner's Notebook. Before taking up the subject of pressure drop, it is necessary to consider calculation of flow rate when vaporization takes place.

Case of Vaporization

In sizing the control valve on the feed from one fractionating column to another (considering that both columns are operating under pressure and that the pressure differential is such that a feed pump is not required), the problem of vaporization may be encountered. In such a case the valve may be sized according to one of the following methods:

1. On the assumption that the flow is all liquid up to the valve and vaporization occurs in the valve. The calculation is made for the liquid only and the next larger valve size is selected.
2. Estimate liquid and vapor volumes separately and calculate the valve flow coefficient, C_v, for each. Since the C_v's represent valve areas the two values so obtained are added and the corresponding valve size taken.
3. Make a process heat balance to establish amount of vaporization.
4. Determine the valve flow coefficient by making the calculation on the basis of volume and density of liquid-vapor mixture considered as a gas.

Change in Pressure Drop

As stated previously, the control valve, operating as a variable orifice in the line, may do so under conditions of:

1. Substantially constant pressure drop across the valve.
2. Where the pressure drop across the valve varies.

In an installation where supply and demand pressures are essentially constant and practically the entire pressure drop of the system is taken across the control valve, inherent characteristic of the valve (in this case preferably linear) will be followed. At the other extreme is the case where both the supply or source pressure and the demand or terminal pressure keep changing and the control valve takes only a small portion of the total pressure drop of the system.

Considering a case between these two extremes, i.e., where supply and demand pressures are steady but the control valve is in series with heat exchangers and other resistances to flow, the pressure drop available to the valve will vary with change in process flow. At higher rates of flow the friction drop through exchangers, pipe fittings, etc., will increase so that the pressure drop across the valve will be correspondingly smaller while at lower rates of flow the differential available to the valve will become greater due to decreased friction drop of the system.

Under the conditions of (1) the valve is sized for maximum flow at the constant design pressure drop. Under the conditions of (2) the effective characteristics of the valve in the particular installation must be evaluated. The variation of flow rate through the valve with change in valve opening is evaluated at different pressure-drop ratios, taking into consideration the flow characteristics of the system as a whole.

Pressure-Drop Ratio

By equation (1) of Installment 20 the flow rate V in g.p.m. of a liquid through the control valve is expressed as:

$$V = \frac{C_v\,(\Delta p)\,½}{(G)\,½}$$

where G = specific gravity of the liquid.

Assume the flow rate through the valve to be V_1 at a pressure drop (Δp), then the flow rate V_2 at a new pressure drop $(\Delta p)_2$ can be obtained from the relation:

$$\frac{V_1}{V_2} = \frac{C_{v1}\,(\Delta p_1)\,½}{C_{v2}\,(\Delta p_2)\,½}$$

Analysis of control-valve action may be made in terms of "valve loading" which is defined as "the actual flow rate through the valve to maximum capacity of the valve at some specific pressure drop." Using the relation that the flow rate is proportional to the square root of the pressure drop, valve loading may be determined under the different conditions existing in a given installation. *(For a full discussion of valve loading see Nolte, The Oil and Gas Journal, November 29, 1947, page 65 and January 1, 1948, page 52).* With a pump in the system the performance characteristics of the pump must be considered. *(See Pellettere, The Oil and Gas Journal, December 8, 1949, page 58.)*

General Rule

Where information is not available for evaluation of the valve performance in relation to the characteristics of the entire system, the general rule is to size the valve at a design pressure drop which is at least 15 per cent of the total pressure drop in the system. In many cases, especially with wide variation in flow, a larger portion of the total friction drop in the system (at maximum flow) may be taken across the valve. The other general consideration is the magnitude of the total head loss. For good control, where the total drop is below 50 psi., for example, it may be desirable to take as much as 50 per cent across the valve, while at higher total friction drop, say upward of 200 psi. it would be preferable to allot 30 per cent or less of the total drop to the valve. Over-all, determination of design pressure drop within the above limits depends on (1) how close a control is desired, and (2) how much waste of power one is willing to accept at lower flow rates.

No. 22 in current series. The Refiner's Notebook has been published continuously since 1944

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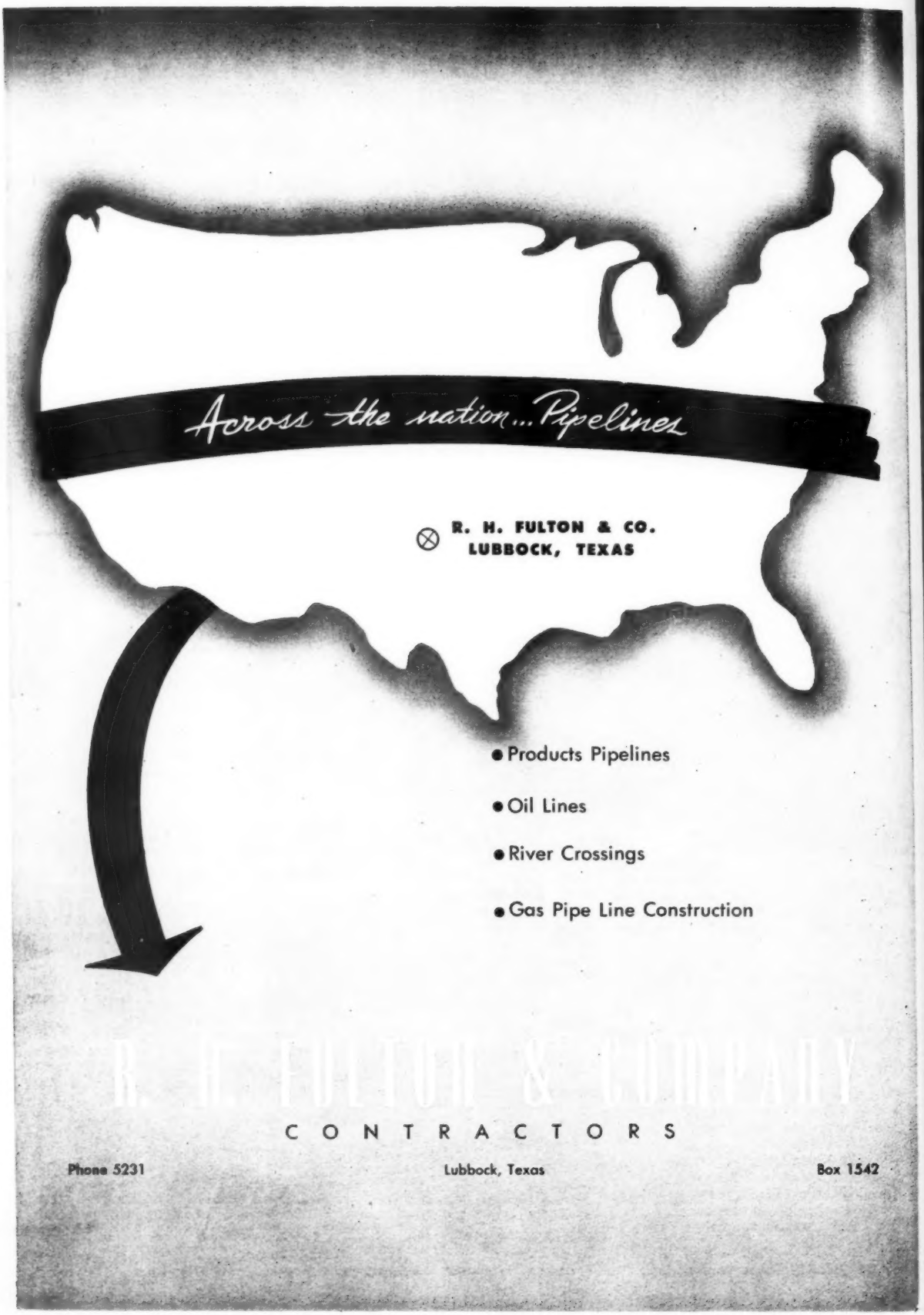
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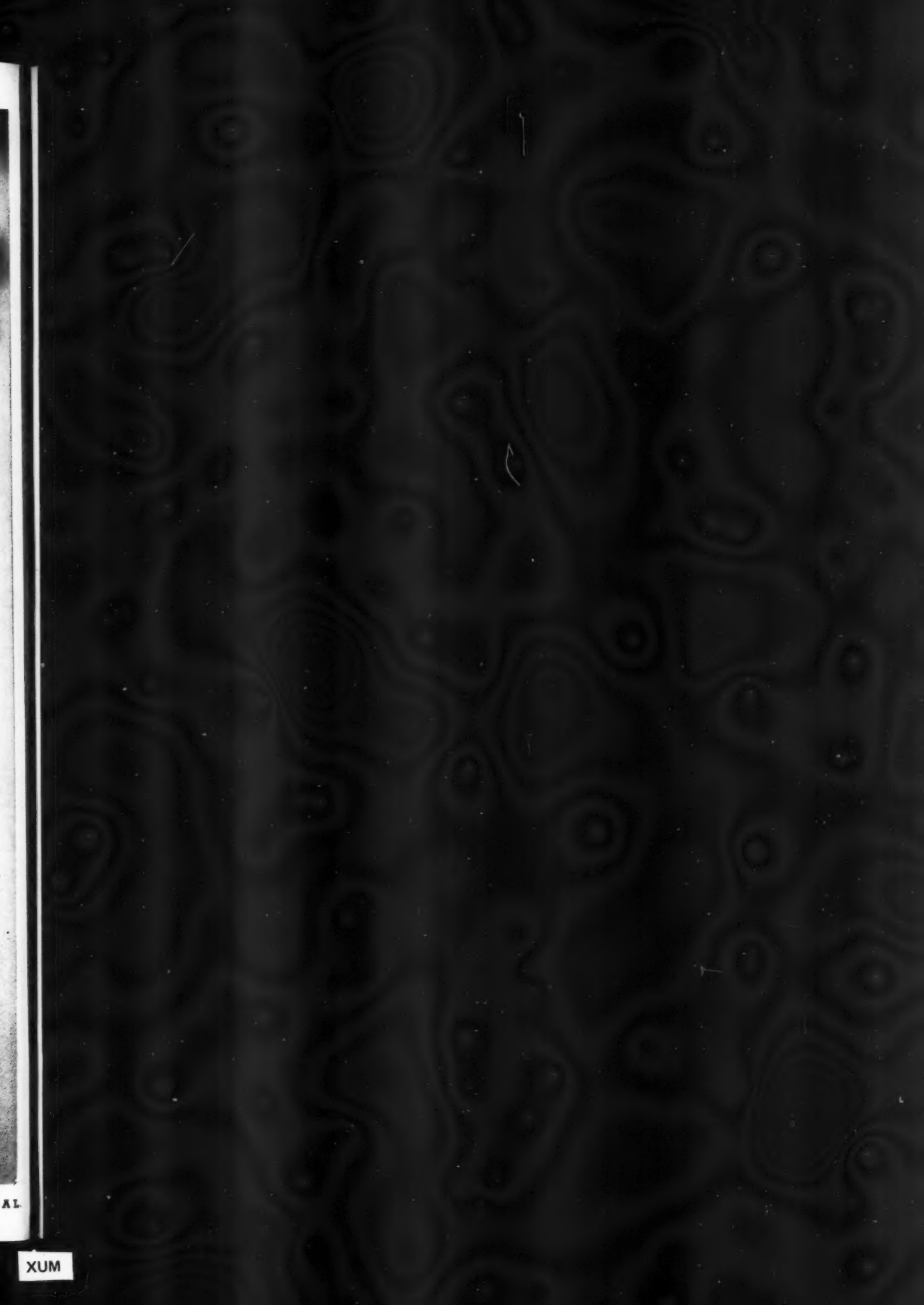

PIPE LINES

Reserves Cited

El Paso Natural seeks authorization of line

WASHINGTON.—Paul Kayser, president of El Paso Natural Gas Co., Houston, testified before the Federal Power Commission here last week that his firm has contracted for sufficient gas reserves in the Permian basin of New Mexico and Texas to meet demands of a proposed new pipe line for several years.

Appearing before FPC during a hearing on El Paso Natural's application for authorization to construct a natural-gas pipe line from the San Juan basin in New Mexico, with a capacity of 150,000,000 cu. ft. daily, Kayser told the presiding examiner that requirements this year should be only 722,300,000 cu. ft. of gas daily from the Permian basin, while contracted sources could provide a net supply of 782,400,000 cu. ft. daily.

By 1960 requirements will have risen to 1,012,000,000 cu. ft. of El Paso's Permian basin reserves, Kayser estimated, and contracts will supply 1,033,800,000 cu. ft. He said that estimated production and sale of residual or "flare" gas in the Permian basin for the company's lines would only be made possible by use of San Juan basin dry gas to "firm up" the load.

The proposed line would furnish additional natural gas to markets in Arizona and California. Bulk of the supply would be delivered to Pacific Gas & Electric Co.'s system at Topock, Ariz., and the remainder would go to Gallup, N. M., and several northern Arizona cities.

A. Faison Dixon, consulting geologist, told the commission that gas reserves in Texas fields "dedicated" to natural-gasoline plants of Standard Oil Co. of Texas and Fullerton Oil Co., both of which have contracts with El Paso, are estimated at 1,183,000,000,000 cu. ft.

No common carrier.—Kayser later testified that his company would resist any effort to compel it to act as a common carrier in transporting gas through its lines from Texas and New Mexico to California. He said it is "not practical for us to act as a common carrier" and added that El Paso has rejected a request it transport gas for Interstate Gas Co. of Nevada.

Thurman Hill, counsel for Interstate, said the company will ask FPC to require El Paso to be a common carrier as a condition for allowing it to construct the San Juan basin line.

Kayser told FPC after being questioned concerning his company's attitude with respect to filing rates as a common carrier: "We would contest any order from you to file rates as a common carrier and take it right up through the courts."

Salt Lake Products Line

A section of the products pipe line of Salt Lake Pipe Line Co., Salt Lake City, between Twin Falls and Boise, Idaho, is now being completed and will be in operation on June 12. The Salt Lake line, totaling 567 miles, consists of 505 miles of 8-in. pipe with the last 62 miles 6-in. pipe.

The section between Salt Lake City and Twin Falls has been in operation over the past 5 months. It is anticipated the final section into Pasco, Wash., will be completed in September.

The Utah Oil Refining Co., which operates a large refinery at Salt Lake City, has under construction 2.6 miles of 6-in. line between its refinery and the pumping station of the Salt Lake Pipe Line Co. The Utah company will use the Salt Lake company line in delivering part of its plant output.

New Terminal Facilities

AMARILLO, Tex.—Shamrock Oil & Gas Corp. announced last week that it plans to begin construction within the next few weeks on new terminal facilities at Denver in connection with proposed extension of its products line, jointly owned with Phillips Petroleum Co., from La Junta, Colo., to Denver.

A location has already been selected at the northeast edge of the city, and facilities will include offices, manager's residence, warehouse, truck-loading facilities, and bulk-storage tanks.

Plans were recently completed to extend the line from the Texas Panmandle, making it 310 miles in length. Like the present line, the extension will be 6-in. pipe.

The products line now carries propane, butane, three grades of motor fuel, diesel fuel, and distillate, to terminal facilities at La Junta. Completion of the extension into Denver is expected by January 1.

Piedmont Proposal Denied

WASHINGTON.—Piedmont Natural Gas Corp.'s application for reconsideration and vacation, or a rehearing, of Federal Power Commission's March 30 orders which authorized Commonwealth Natural Gas Corp. to construct pipe-line facilities to serve

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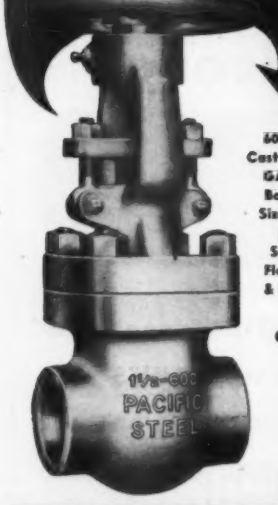

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natural-gas markets in Virginia has been denied by the commission.

FPC's previous orders also denied the portion of Piedmont's application proposing service in the tidewater area of Virginia.

Midwestern Completing Line

TULSA.—Midwestern Constructors, Inc., is completing the laying of 147 miles of 12-in. line between Atchison, Kans., and Omaha, Nebr., for Great Lakes Pipe Line Co. This line parallels an existing line and is part of a $55,000,000 construction program by the Great Lakes company.

The Midwestern company is also laying 69 miles of 26-in. between Ottawa and Liberal, Kans., for Panhandle Eastern Pipe Line Co. This is part of a major looping program of Panhandle Eastern.

The laying of 108 miles of 26-in. for Northern Natural Gas Co. will be started by Midwestern Constructors in the immediate future. This is a 26-in. looping line extending from Plattsmouth, Nebr., to a point near Omaha. This line is to be completed by fall.

Trunkline Orders Pipe

OAKLAND, Calif.—Trunkline Gas Supply Co. has awarded contract to Kaiser Steel Corp. here for $35,000,000 worth of steel line pipe for its newly authorized Texas-to-Illinois natural-gas line.

Contract calls for 1,300 miles of 10¾ to 26-in. pipe, which totals about 255,000 tons. Pipe will be fabricated at Napa, Calif., from plate rolled at Kaiser's Fontana mill.

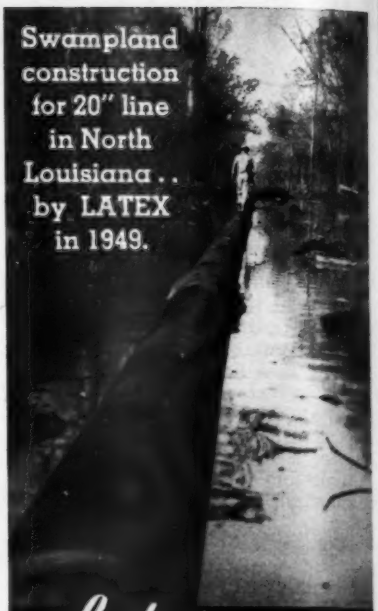
Trunkline's new $80,000,000 gas carrier is designed to increase natural-gas supplies in several northern states. It will originate in the Gulf Coast area near McAllen, Tex., and run to Tuscola, Ill., near Decatur, where it will connect with the gas-distribution system of Panhandle Eastern Pipeline Co., of which Trunkline is a subsidiary.

Trunkline has completed financing arrangements for construction of the $80,000,000 project, according to William G. Maguire, chairman of the board of the firm, and of Panhandle Eastern, the parent company.

Southern's Proposal O.K.'d

WASHINGTON. — Federal Power Commission has authorized Southern Natural Gas Co., Birmingham, to expand its natural-gas pipe-line system in the South to meet increased market demands. The project, to cost $32,928,630, will include 496 miles of new high-pressure lines and 311 miles of laterals.

(Details of the program were given in The Oil and Gas Journal, May 4, 1950, page 167.)



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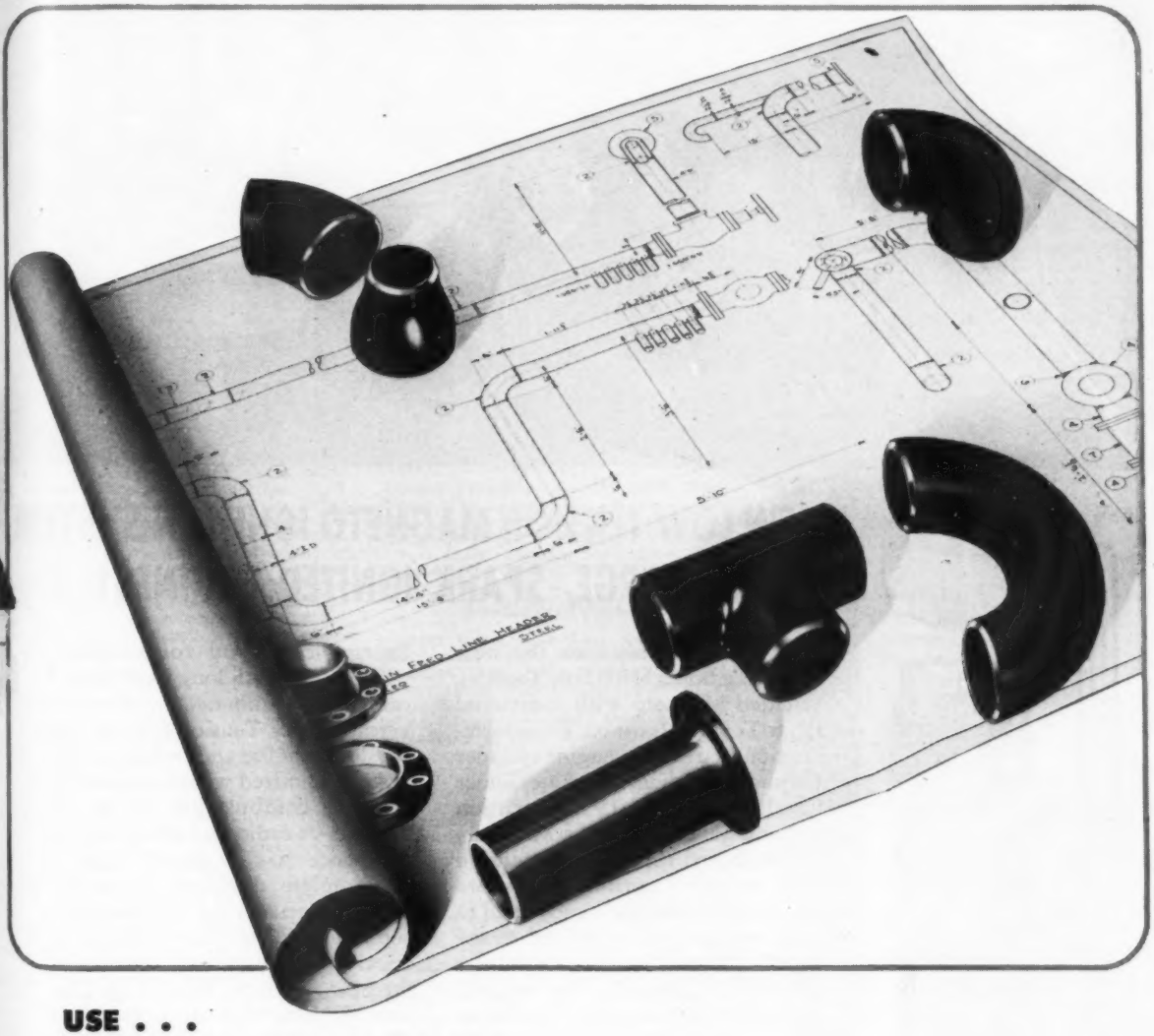

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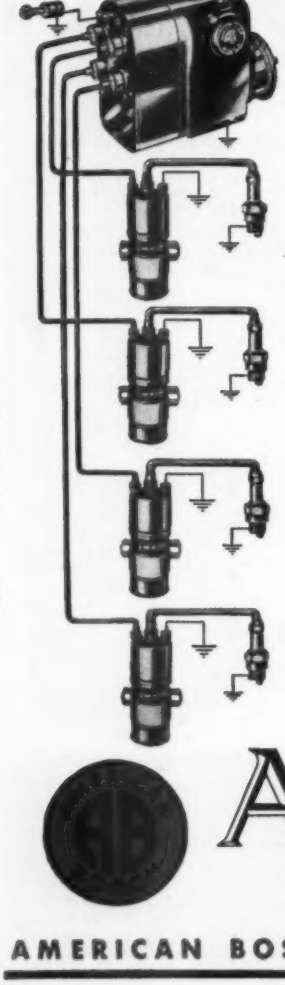

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Pipe-Line Construction

FOLLOWING is a tabulation of domestic pipe-line projects which are planned or under construction. Included are crude-oil, products, and natural-gas lines. The list was compiled from surveys made by The Oil and Gas Journal.

Crude-Oil Pipe Lines

Gulf Refining Co.—29 miles 8-10-in. lateral in Scurry County, Texas, under construction; Latex Construction Co., contractor; J. B. Latham, superintendent; field office, Loraine, Tex.

Humble Pipe Line Co.—371 miles, 18-in., under way, West Texas-Satsuma Station to Baytown, Tex.; 178-mile western section contracted to Morrison Construction Co.; 193-mile eastern section contracted by Anderson Brothers Corp.

Magnolia Petroleum Co.—60 miles 4-24-in. gathering system in La Ward and Lolita fields, Texas; Henry L. Lemons & Co., contractor; W. A. Remington in charge.

Mid-Valley Pipe Line Co. (Sun and Sohio)—1,000 miles, 20-22-in., under way, Longview, Tex., to Mayersville, Miss.-Covington, Ky., to Lima, Ohio. Contracts let for 857 miles as follows: Section 2, Haynesville, La., to Mayersville, Miss., Latex Construction Co.; spread office, Farmerville, La.; F. A. Silar, general superintendent; W. A. Briley, spread superintendent; office at Cotton Valley, La., W. H. Hayes, superintendent; M. L. Thompson, assistant superintendent. 61 miles, 12-in., lateral, Delhi to Lake Providence, La.; headquarters, Lake Providence; E. C. Norris, general superintendent; R. E. Thornton, superintendent. Section 3-A, Mayersville to Oakland, Miss., Associated Pipe Line Contractors, Inc.; J. A. Williams and L. H. Gray, spreadmen; field office, Charleston, Miss.; Section 3-B 4-A, Oakland, Miss., to Henderson, Tenn., Houston Contracting Co., E. C. Norris, superintendent; field office, Batesville, Miss.; Section 4-B, 5-A, Henderson to Clarksville, Tenn., Eastern Construction Co.; work started April 1; to be completed by September 1, 1950. Louie Stewart and Cliff Simmons, spreadmen; field offices, Clarksville and Lexington, Tenn. Section 5-B, 6-A, Clarksville, Tenn., to Elizabethtown, Ky., field office, Clarksville, Fred L. Byers, superintendent; Britton Construction Co.; Section 6-B, 111 miles of 22-in., Elizabethtown to Hebron, Ky., H. L. Gentry Construction Co., Frank Morris and Jim Mitchell, spreadmen; field office, Warsaw, Ky., Section 7 South, Hebron, Ky., to Eaton, Ohio, Britton Construction Co., field office, Hamilton, Ohio; spreadman, Fred Peters; Section 7 North, Eaton to Lima, Ohio; Section 8, Magnolia, Ark., to Haynesville, La. Longview, Tex.-Haynesville, La., section, 110 miles 20-in., contracted to O. R. Burden Construction Co.; G. A. Lewis, spreadman; office, Marshall, Tex.

Cumberland and Tennessee rivers, Eastern Construction Co.; field office, Clarksville, Tenn., Fred L. Byers, spreadman.

41 miles, 20-in., Haynesville, La., to Red River near Benton La.; Latex Construction Co., contractor; H. L. Leake, superintendent; headquarters, Cotton Valley, La. W. A. Briley, assistant superintendent; Sam B. Harrison, office manager.

Naph-Sol Refining Co.—25 miles 6-in., under construction, Kimball Lake oil field, Newaygo County, Michigan, to refinery at Muskegon; Young Construction Co., Olney, Ill., contractor.

Pan American Pipe Line Co.—80 miles, 16-in., southern part of Scurry County, Texas, to connect with Humble Pipe Line Co.'s system near San Angelo, Tex. Work to begin in May. (Contract not let.)

Phillips Petroleum Co.—45 miles 2-24-in., gathering system near Andrews, Tex.; Vaughn & Taylor Construction Co., contractor; Jess Moore in charge.

281 miles 10-in., planned, Borger, Tex., to Yale, Okla.

Pasotex Pipe Line Co.—32 miles 4-8-in., authorized, North Snyder, Tex., lines for gathering, delivery to Basin System.

Portland Pipe Line Co., Montreal Pipe Line Co., Ltd.—236 miles, 18-in., planned, Portland, Me., to Montreal, Que., Canada, contracted as follows: Oklahoma Contracting Co., 85 miles in Section 1 at southern end; Portland, Me., to Gorham, N. H.; H. A. Wylie, superintendent; Lisle W. Chambers, paymaster; office, Barton, Vt.; work starts June 1. Associated Pipeline Contractors, Inc.; L. H. Gray, spreadman. Section 2, 81 miles; and Fred Mannix Co., Ltd., 68 miles, Section 3, in Canada.

Richfield Oil Corp.—40 miles, 10-in., Cuyama Valley-Newhall, Calif., planned. 60 miles, 14-in., applying field joints, Newhall-Wilmington, Calif., under way.

Stanolind Pipe Line Co.—36 miles, in Kent County, Texas, outlet for Scurry County crude.

Texas-Empire Pipe Line Co.—42 miles, 16-in., authorized, Wilmington, Ill., to East Chicago, Ind.; O. E. Burden Construction Co., contractor; Pete Hiner, spreadman; office, Wilmington, Ill.

Texas Pipe Line Co.—42 miles 12¾-in., Patoka, Ill., to Clay City, Ill.; L. R. Young Construction Co., contractor; field office, Flora, Ill.: Whity Ralph, spreadman.

Texas-New Mexico Pipe Line Co.—37 miles, 10-in., proposed, Scurry County, Texas.

Products Pipe Lines

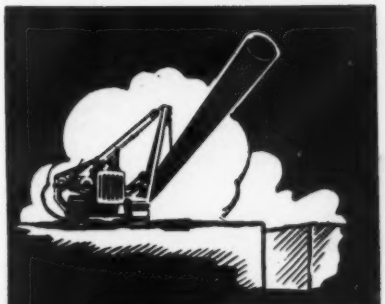
Great Lakes Pipe Line Co.—261 miles, 12-in., under way; contracted as follows: 52 miles, 15-in., Albert Lea to Fairbault, Minn.; under construction; Sheehan Pipe Line Construction Co., contractor; field office, Albert Lea, Minn.; C. W. Henderson, spreadman. 50 miles 12-in., St. Paul to Fairbault, Minn.; J. W. Brown, spreadman; office, Northfield, Minn. 50 miles 12-in., State Line to Fairbault, Minn., C. M. Brown, spreadman; office, Albert Lea, Minn. O. R. Burden Construction Co., 64 miles north from Des Moines; field office, Nevada, Iowa; G. D. Lewis, spreadman; A. C. Holder Construction Co., 72 miles to Iowa-Minnesota state line; Williams Brothers Corp., 20 miles, Mississippi River crossing and line to terminal and station. Kansas and Missouri river crossings, R. H. Fulton & Co.; field office, Kansas City; Ed Veach, spreadman.

Second 12-in. line to be constructed between Barnsdall, Okla., and Kansas City, Kans., paralleling the 12-in. recently completed, and three existing 8-in. lines. Work to start as soon as pipe is delivered.

290 miles, 12-in., Tulsa to Kansas City, Mo. Contracted as follows: 54 miles, Ponca City to Barnsdall, Okla., O. R. Borden Construction Co.; and 236 miles, Barnsdall, Okla.-Kansas City, Mo., Pacific Pipe Line & Engineers, Ltd. James Howe, superintendent for Pacific Pipe Line portion is headquartered at Chanute, Kans.; spread office at Tulsa with Ham Hamilton general spreadman and river-crossing spreadman; spread office at Dewey, Okla., Loue Robertson, spreadman; and spread office at Paola, Kans., Larry Webb, spreadman.

355 miles, 12-in., authorized, Kansas City through Omaha and Sioux City, Iowa, to Sioux Falls, S. D.

189 miles, 12-in., authorized, Kansas City to Des Moines, contracted as follows: 36 miles 12-in., Kansas City, Mo., northward through Platte, Neb.; Trojan Construction Co., contractor; field office, Parkville, Mo.; Swede Tillotson, spreadman; 37½ miles, 12-in. Clay, Clinton, DeKalb, and Daviess counties, Missouri; Trojan Construction Co.,



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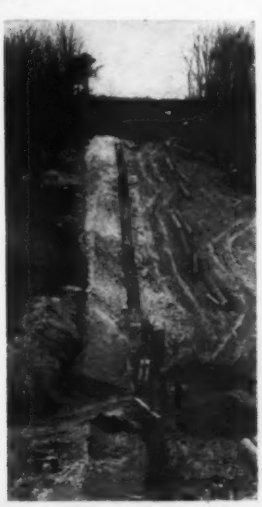

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OKLAHOMA CONTRACTING
DOES IT!

contractor; field office, Cameron, Mo.; Felix Johnson, spreadman; Brodie Construction Co., 37-mile middle section; field office, Bethany, Mo.; A. T. Rathjen, spreadman; R. H. Fulton & Co., two 38-mile northern sections, Osceola to Des Moines, Iowa; Jerry Nash, spreadman; office, Osceola.

48 miles, 8-in., authorized, Cushing-Drumright-Tulsa, Okla.; Trojan Construction Co., contractor; field office, Sapulpa, Okla.; Slim Deaver, spreadman.

Phillips Petroleum Co.—155 miles 6-in., extension to present 200-mile line from Phillips, Tex., to LaJunta, Colo., on to Denver.

Standard Oil Co. (Ohio).—38 miles 8-in., authorized, Toledo to Fostoria, Ohio.

Salt Lake Pipe Line Co.—242 miles, 6-8-in., Boise, Idaho-Pasco, Wash., planned. Contracted as follows: Morrison-Knudson Co., Inc., Macco Corp., and Bechtel Corp., 140-mile section from Boise to Baker, Idaho; Pacific Pipeline & Engineers, Ltd., Baker to Pasco, Wash. Pacific Pipeline & Engineers, Ltd.'s, field office, LaGrande, Ore.; L. E. Robertson, spreadman.

63 miles 8-in., Mountain Home to Boise, Idaho; Oklahoma Contracting Corp., contractor; Aldress Kilgore, supt.; R. F. Mueller, paymaster. Office, Mountain Home. Construction to begin May 1.

Natural-Gas Pipe Lines

Alabama-Tennessee Natural Gas Co.—80 miles 10-in., under way, Selmer, Tenn., to Muscle Shoals, Ala.; 35 miles 8-in., authorized, Muscle Shoals to Decatur, Ala.

Algonquin Gas Transmission Co.—276 miles, Lambertville, N. J., to Boston area, proposed.

492 miles laterals, New England area, proposed.

Atlantic Gulf Gas Co. (United Gas Pipe Line Co.)—1,530 miles, planned, Alabama-Florida-Georgia-South Carolina.

Central Hudson Gas & Electric Corp.—40 miles, authorized, Tuxedo, N. Y., station, Home Gas Co. line now under construction, to Poughkeepsie, N. Y.

Central Kentucky Natural Gas Co.—38 miles, 12-20-in., planned, Kentucky loops.

Chicago District Pipe Line Co.—41 miles, 24-in., planned, Joliet, Ill., to Chicago.

City of Indianapolis, Ind., Inc.—55 miles 16-in., proposed, Indianapolis to Texas Eastern Transmission Corp.'s system.

Cities Service Gas Co.—47 miles, 3-4-16-in. planned, in Kansas.

Coastal Pipe Line Co.—1,000 miles, planned, Texas to Norfolk, Va.

Colorado-Wyoming Gas Co.—41 miles, planned, Greeley, LaSalle, and Windsor, Colo., areas.

Commonwealth Natural Gas Corp.—537 miles, 20-in., planned, West Bend, Ky., to Norfolk, Va.

200 miles, authorized, Green County, Virginia, to Norfolk.

East Tennessee Natural Gas Co.—188 miles, 16-in., Lobelville-Chattanooga, Tenn., contracted by Walters & Saigh Construction Co., for construction in 1950; 128 miles, 12-in., Chatanooga-Knoxville, Tenn.; contracted by Walter and Saigh Construction Co., for construction in 1950; Robert E. Floyd, spreadman; field offices, Athens and Cleveland, Tenn.; Carl Doyle, general superintendent; James E. Gray, office manager; 100 miles of laterals to be laid in 1950. Construction 150 miles, 16-in., Knoxville-Bristol, Tenn., under consideration.

El Paso Natural Gas Co.—All work done by company crews.

Looping of 26-in., New Mexico-California line and connection with Pacific Gas & Electric Co. at Needles, Calif. 352 miles, 30-in., completion November 1950; spreads as follows: 119 miles 30-in., Wenden to Topock, Ariz., Ed Alsup, spreadman; office, Salome, Ariz.; (Spread No. 2 is shut down due to lack of pipe; office, Jal, N. M., Jack Smith, spreadman); 15 miles 2-in., Bowie, Ariz.; G. George, spreadman.

450 miles, 30-in., under construction, Eunice, N. M.-Blythe, Calif., looping; completion March 1950.

450 miles, 24-in., planned, San Juan basin, New Mexico to Franconia, Ariz.

Home Gas Co.—70 miles, planned, Orange, Sullivan-Rockland counties, New York-Cattaraugus County, New York, areas.

Jersey Central Power & Light Co.—39.4 miles, 10-in., planned, New Jersey to Coast system, Texas Eastern Transmission Co.'s Big Inch.

Michigan-Wisconsin Gas Co.—185 miles, 4-14-in. laterals, Milwaukee-Fond du Lac, Sheboygan, and Green Bay, Wis., under construction; C. C. Griffis Construction Co., contractor; Paul Means, superintendent for Lake Del Mort crossing.

Montana-Dakota Utilities Co. and Montana-Wyoming Gas Pipe Line Co.—340 miles, 12¾-in., planned, Worland, Wyo., to Cabin Creek, Mont.; R. A. Conyes Construction Corp., contractor; Al Poggi, general superintendent; Chester Kincaid and Jimmy Alman, spreadmen.

Montana Power Co.—83 miles, 12¾-in., planned, Butte to Bozeman, Mont.; field office, Three Forks, Mont.; C. N. Deaton, spreadman.

New York State Natural Gas Corp.—53½ miles 16-in., loops, Pennsylvania.

Northeastern Gas Transmission Co.—811 miles, up to 20-in., planned, in New England area.

Northern Natural Gas Co.—41 miles, 20-in., under construction, Southwest from Garden City, Kans.; R. H. Fulton & Co., contractor.

597 miles of looping in 10 sections, contracted as follows: R. H. Fulton & Co., loops 1 to 5: loop 1, 40.2 miles, 26-in., extending northward from a point 28.7 miles north of Skellytown station in Pampa, Tex., area; loop 2, Beaver, Okla., station, 74.9 miles, 26-in.; loop 3, Mullinville, Kans., station, 33¼ miles, 26-in.; loop 4, Bushton, Kans., station, 72½ miles, 26-in.; loop 5, from a point west fo Garden City, Kans., to Bushton, Kans., station, 155 miles, 20-in. M. L. Boyd, spreadman; office, Perryton, Tex.; and N. A. Veach, spreadman; office, Liberal, Kans. Midwestern Constructors,

Williamson Gas Line Pigs* Traverse 1½R 90° Bends

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New Design
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Unique design of the "Dryseal" Thread provides actual crushing and sealing at both major and minor diameters, effectively preventing spiral leakage, even under extreme pressures.

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STANDARD PRESSED STEEL CO.
JENKINTOWN 25, PENNSYLVANIA

Inc., loops 6 and 7; loop 6 from a point 29 miles northeast of Palmyra, Nebr., station, 43.4 miles, 26-in., to Oakland, Iowa, station; loop 7, from a point 17.8 miles northeast of Oakland, Iowa, station, 65.9 miles, 26-in. R. B. Potashnick, loops 8 to 10; loop 8, southwestward from Ventura, Iowa, station, 31.2 miles, 26-in.; loop 9, northward from Ventura station, 41 miles, 26-in.; loop 10, from the north end of a 26-mile gap beyond loop 9, where another loop will be built consisting of 39½ miles, 26-in.; total 111 miles, 24-in.; field office to be located at Ogden, Iowa, June 1; Boyd, spreadman.

Northwest Natural Gas Co.—750 miles planned; Washington, Oregon, and Idaho.

Pacific Gas & Electric Co.—506 miles 34-in., under construction, Topock, Ariz.-Milpitas, Calif.; Bechtel-Price-Conyes, contractor; main-line office, Barstow, Calif.; R. L. Bowman, general superintendent.

Panhandle Eastern Pipe Line Co.—160 miles, additions to present system; approved. Also, 188 miles to be built in conjunction with the 160-mile project, along entire system. (Previously approved by FPC.)

69 miles 26-in. loops, Olpe to Hugoton, Kans.; Midwestern Constructors, Inc., contractor; office, Ottawa, Kans.; M. L. Wilhite, superintendent.

Panhandle Eastern Pipe Line Co.—35[illegible] miles, 26-in., authorized, looping in Texas, Oklahoma, Kansas, Missouri, Illinois, Indiana, Ohio, and Michigan.

Peoples Gas Light & Coke Co.—Planned 12 miles, 24-in., Joliet-Chicago, Ill.

Phillips Petroleum Co.—25 miles gathering system in West Edmond, Okla., field under construction; Vaughn & Taylor Construction Co., Inc., contractor; spread office Edmond, Okla.

118 miles, 3-to-20-in., gas-gathering system in Sherman and Hansford counties, Texas; Vaughn & Taylor Construction Co., Inc., contractor; D. D. Vaughn, spreadman; field office, Texhoma, Okla.

Phillips Petroleum Co.—118 miles 3-26-in., gas-gathering system, Sherman and Hansford counties, Texas; Vaughan & Taylor Construction Co., Inc., contractor; field office, Texhoma, Okla.; D. D. Vaughn and Jess Moore, spreadmen. Work 60 per cent complete.

Piedmont Natural Gas Corp.—1,350 miles 20-in., planned, Greenville, Miss., to Norfolk, Va.

Plains Natural Gas Co.—78 miles, gathering system, Oklahoma-Kansas area, Hugoton field. Contracted by: Arey-Phillips Construction Co., Amarillo, Tex.; Tulsa Pipe Coating Co., Mid-Western Constructors, Inc., Engineering and supervision. Latter firm represented by Lyle DeWitt; field office, Liberal, Kans.

Roanoke Pipe Line Co.—30 miles 8-in., Gala, Va., to Roanoke, authorized.

South Jersey Gas Co.—77 miles, planned, Camden to Atlantic City.

Southern California Gas Co.—80 miles 30-in., Whitewater to Puente, Calif., under way; field office, Bonning, Calif.

Southern Natural Gas Co.—375 miles, 24-in., planned, Gwinville, Miss., to Atlanta.

225 miles, 16-in., planned, Colfax, La., extension.

110 miles, 11-in., considered; extension.

314 miles, 18-in., planned; extension.

171 miles, 16-in., planned; extension.

118 miles, 13-in., planned; extension.

Southern Union Gas Co.—78 miles, 8-10-14-in., planned, New Mexico loops and laterals.

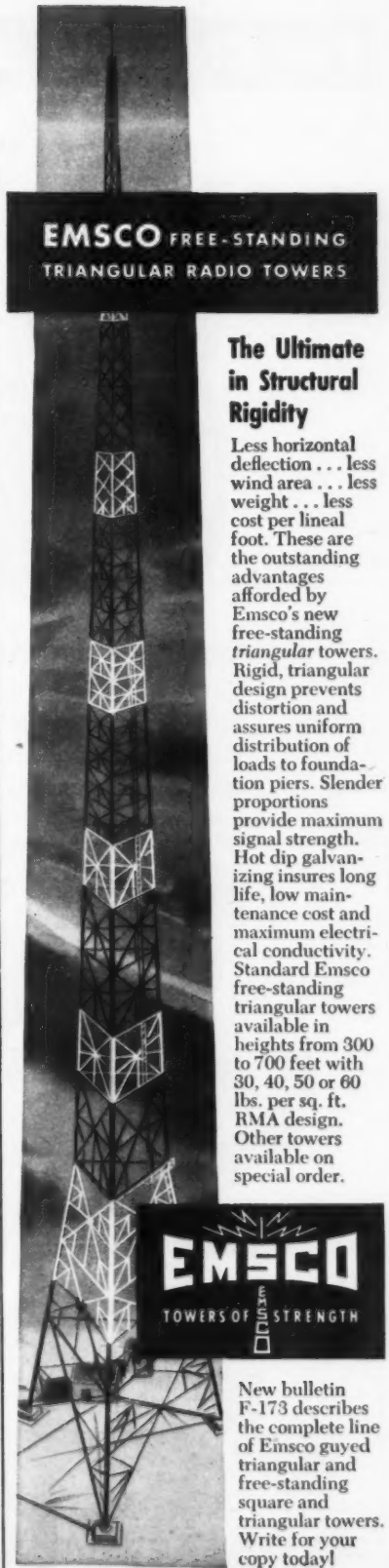
Tennessee Gas Transmission Co.—65 miles, 16-in., planned, Ohio-Pittsburgh spur.

790 miles, 20-26-in., planned, Burnaugh, Ky., to Boston, including 400-mile line to Buffalo.

992 miles, 30-in., planned, first 150 miles of loops to be laid at Monroe, La., Greenville, Miss., Midland and Portland, Tenn.

385 miles 26-in., Greenup County, Kentucky, to New York; contracted to H. C. Price Co., Bartlesville, Okla.

Latex Construction Co. has following contracts: 123 miles, 30-in., West Monroe to Many, La., W. H. Hayes, superintendent, field office, Jonesboro, La.; 95 miles, 30-in., Natchitoches to Kinder, La.; F. A. Silar,



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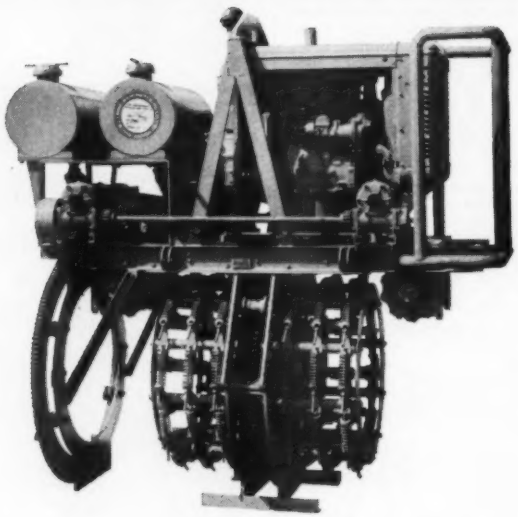

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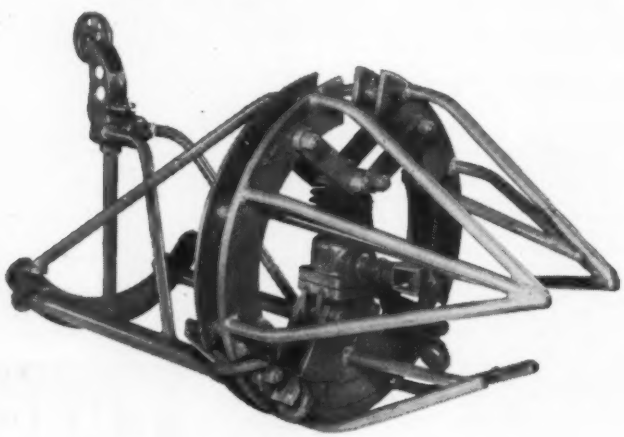

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superintendent, W. A. Briley, assistant; field office, Kinder, La.

54.2 miles, 30-in., under construction, White Bluff area to Joelton, Tenn., area, contracted to Morrison Construction Co.

36.1 miles, 30-in., under construction, Glasgow, Ky., area to Joelton area, contracted to Morrison Construction Co.

18.1 miles, 30-in., under construction Union City to Buckeye, Ky., Anderson Brothers Corp., contractors.

47 miles 30-in., Glasgow to Lebanon, Ky.; H. C. Price Co., contractor; field office, Scottsville, Ky.; R. L. McMillon, spreadman.

99 miles 30-in., under way, Dickson to Selmer, Tenn.; field office, Dickson, Tenn.; Jack Hodges, spreadman.

63 miles 26-in., Mahoning River near Youngstown, Ohio, southward; H. C. Price Co., contractor; G. A. Reutzel, supt.; field office, Columbiana, Ohio. 63 miles 26-in., Muskingum River northeastward; R. K. Shivel, supt.; office, Zanesville, Ohio; 47 miles 26-in., Muskingum River southwestward; W. B. Williams, supt.; office, McConnelsville, Ohio; 47 miles 26-in., Ohio River northeastward; C. R. Ice, supt.; office, Portsmouth, Ohio. (Balance of 373-mile Ohio River-Buffalo project to be started in August 1950.)

27.7 miles, 12-in., under construction, El Campo, Tex., to near Traitor, Tex.; Massey Construction Co., contractor.

25 miles, 30-in., Hardeman and McNairy counties, Tennessee; H. C. Price Co.; field office, Selmer, Tenn.; J. A. Reutzel, spreadman.

103 miles 30 and 26-in. loops, Premont to El Campo, Tex.; Oklahoma Contracting Corp., contractor; M. E. Shiflett, supt.; Joe Freeman, paymaster. Work under way.

70 miles, 26-30-in., between stations 104 and 110; Anderson Brothers Corp.; field office, Richmond, Ky.; E. C. McCoy and Arkie Hobson, spreadmen.

170 miles of 28 and 30-in., contracted by Anderson Brothers Corp., in Kentucky

91 miles 30-in., Holly Springs, Miss., south; contracted to Oklahoma Contracting Corp.; Raymond Law, supt.; Gene Gohring, paymaster; office, Holly Springs; work to begin June 1.

Texas-Eastern Transmission Corp.—1,400 miles planned, Texas to Pittsburgh loops.

108 miles 16-in., authorized, Provident City to Baytown, Tex.

33 miles, 20-in., Hankamer to Beaumont, Tex.; Associated Pipe Line Construction, Inc., contractor; field office, Liberty, Tex.; C. E. Rogers, spreadman.

Texas Gas Transmission Corp.—103 miles, 20-in., Carthage, Tex., to near Lisbon, La., (Sharon); under construction. N. A. Saigh Co., Inc., contractor; Carthage, Tex.; Bob Floyd, representative. Construction subcontracted: (1) Fowler Brothers, 43 miles from Carthage to Red River, field office at Carthage; M. C. Johnson, spreadman; (2) 63 miles to Sharon station, Oklahoma Contracting Co. (J. R. Horrigan) field office at Minden, La.; Ed Flanagan, spreadman.

32 miles, planned, Slaughters, Ky., to Evansville, Ind.

Texas Illinois Natural Gas Pipeline Co.—1,400 miles, 30-in., planned, La Gloria field, Texas, to Joliet, Ill.

58-mile, 20-in. lateral, Joliet terminal to connection with Natural Gas Pipeline Co. of America near Volo, Ill.

Transcontinental Gas Pipe Line Co.—Texas-New York 1,840 miles, 30-in., main line and 500 miles, 4 to 22-in., gathering line. Section of 605 miles of 30-in. nearing completion.

Section 6, Newman, Ga., to Danielsville, Ga., 108 miles; Williams Brothers Co.; field office, Monroe, Ga.; Thelmer Davis, spreadman. Section 7, Danielsville, Ga., to Saluda River, South Carolina; 86 miles; Williams Brothers Co. Section 8, Saluda River, South Carolina, to Catawba River, North Carolina, 102 miles; R. H. Fulton & Co. Section 9, Catawba River, North Carolina, to North Carolina-Virginia boundary, 100 miles; Clark Williams, spreadman; field office, Spartanburg, S. C. R. H. Fulton & Co.; A. A. Corrigan, supt.; Clark Williams, general supt. Section 10, North Carolina-Virginia bound-

ary to James River, Virginia, 86 miles; O. R. Smith Contracting Corp. Section 11, James River, Virginia, to Potomac River, Virginia; 110 miles; O. R. Smith Contracting Corp. Section 12, Potomac River, Virginia, to Susquehanna River, Pennsylvania, 76 miles; Associated Engineers & Contractors, Inc., spreadman, Cecil Rogers; field office, Towson, Md.; Section 13, Susquehanna, Pennsylvania, to Delaware River, 90 miles; Wunderlich & Griffis Construction Co. Section 14, Delaware River to Hackensack River, New Jersey, 61 miles; Wunderlich & Griffis Construction Co. Section (unnumbered), Hackensack River, New Jersey, to Hudson River, New York, 23 miles; Oklahoma Contracting Co.; field office, Edgewater, N. J.; M. E. Shiflett, spreadman.

616 miles main and gathering lines west and south of Eunice, La. (361.1 miles is for main line and 255 miles for gathering lines.) Contracted as follows:

Schedule A.—Mercedes to south of Falfurrias, Tex., 80.1 miles 10 to 14-in. main line; Massey Pipe Line Construction Co., contractor; work to start in April or May.

Schedule B.—South of Falfurrias to Edna, Tex., 153.1 miles, 24 and 26-in. (H. B. Zachary Co., San Antonio, has contracted laying of 108 miles 24-in. in Schedule B.) Remaining 45 miles yet to be contracted. Work starts September 1.

Schedule C.—Edna to Porters, Tex., 114.9 miles, 26 and 30-in., to start in August. Contract to be announced.

Schedule D.—Porters to Sabine River, 91.5 miles, 30-in., contracted by Texas Southern Contracting Co., Fort Worth,; work to start in July.

Schedule E.—Sabine River to Eunice, La., 81.5 miles, 30-in., contracted by Anderson Brothers Corp., Houston; work starts in July.

Texas Unit I.—Gathering laterals to begin in May; El Campo, Tex., area, 58 miles 4 to 14-in., contracted to T. & R. Construction Co., Houston. Wharton, Tex., area, 98 miles, 6 to 14-in., contracted to Altgelt Construction Co.

Texas Unit II.—Work to start in May; Sinton, Tex., area, 38 miles, 4 to 8-in., contracted to Shanks & Eustace, Inc., Alice, Tex.; Dix, Tex., area, 61 miles 6 to 10-in., contracted to Victoria Oil Field Maintenance Co., Victoria, Tex.

Schedule 7—86 miles of 30-in., Georgia, South Carolina, being started by Williams Brothers Corp. Spread under T. E. Davis; field office, Elberton, Ga.

Schedule 8—102 miles of 30-in., and Schedule 9, 100 miles 30-in., in South Carolina and southern Virginia, contracted to R. H. Fulton & Co.; operations under way in northern South Carolina; A. A. Corrigan, supt.; Clark Williams, general supt.

Schedule 10—86 miles of 30-in., and Schedule 11, 110 miles 30-in., contacted to Smith Contracting Corp.; work under way, R. M. Jones spreadman; field office, Altavista, Va.; to go east to meet spread to be put in field later under C. C. Craig; offices, Herndon, Va.; which will work west from Potomac River.

Schedule 15—24 miles of 30-in., northern end running to Hudson River, under construction; Oklahoma Contracting Corp.; M. E. Shiflett, spreadman; office, Edgewater, N. J.; Omaha Dredge & Dock Co., preparing laying of 30-in. across Hudson River in May.

85 miles, 4 to 14-in., gathering system, South Louisiana; J. B. Latham, superintendent; headquarters, Vinton, La.; Latex Construction Co., contractor.

50 miles, 18-20-in., gathering line, South Louisiana; O. R. Burden Construction Co., contractor.

Trunkline Gas Supply Co.—1,775 miles 10-26-in., planned; includes 740-mile, 26-in main line from Lake Charles, La., to Tuscola compressor station on Panhandle Eastern Pipe Line Co., (approved), and 1,035 miles, 10-24-in., Lake Charles, La., to McAllen, Tex., field lines, pending FPC approval of changed plans.

United Fuel Gas Co.—32 miles, 20-in., authorized; Roane, Calhoun, and Wetzel counties, West Virginia.

United Gas Pipe Line Co.—90 miles, 16-in., planned, West Bay field to New Orleans.

105.6 miles, 20-in., authorized, loop line paralleling Carthage, Tex.-Sterlington, La., and extending on to near Monroe, La.

26 miles in Louisiana conecting with East Texas system, planned.

United Natural Gas Co.—29 miles, 12-in., authorized, laterals, Elk County, Pennsylvania.

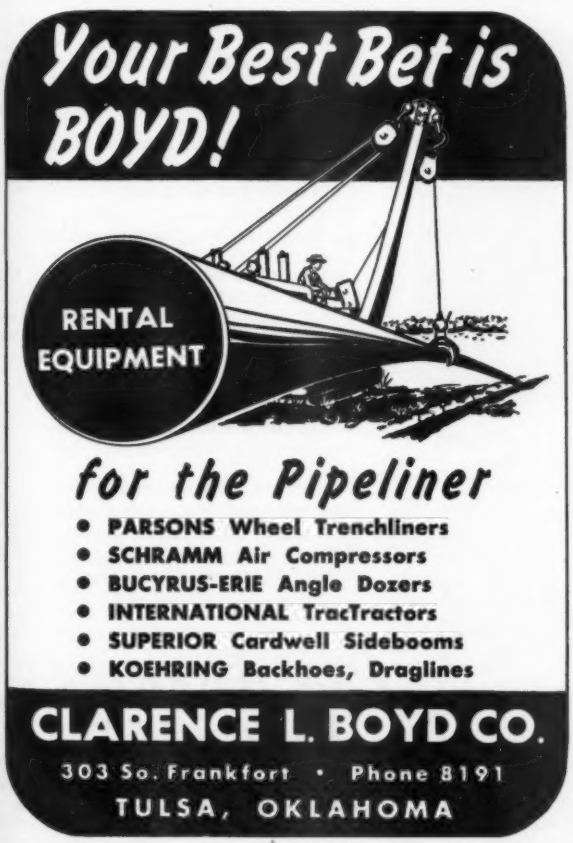
Virginia Natural Gas Co.—153 miles, planned, Buckingham to Richmond and Portsmouth, Va.

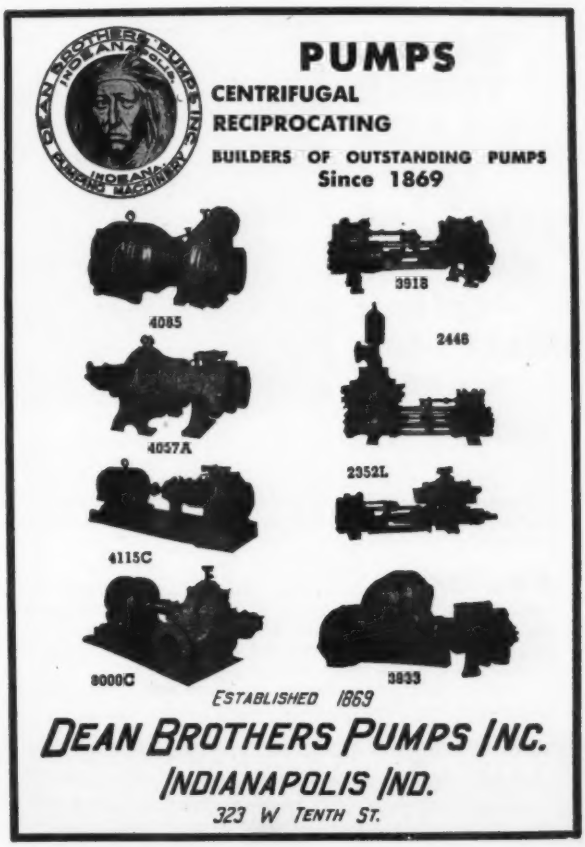
Underground Storage O.K.'d

WASHINGTON.—Federal Power Commission has authorized Iroquois Gas Corp., Buffalo, to develop three new underground natural-gas storage fields, to enlarge an existing field, and to construct approximately 23 miles of pipe line, all in western New York State.

Purpose of the construction and expansion program estimated to cost $2,119,500, is to help meet the heavy winter peak-day demands.

Two of the underground storage pools which Iroquois will develop are located in Erie County, one near Wales and Holland, and the other in the Evans area. The third new field is in the vicinity of Bennington in Wyoming County. The existing field to be enlarged is the Collins storage field, at Collins, in Erie County.





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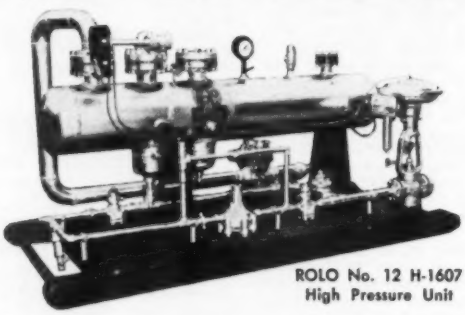

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NATURAL GAS

T.G.T. Expanding

Acquires control of Louisiana Natural Gas

Dahl M. Duff

NEW YORK.—Texas Gas Transmission Corp., which now draws its natural gas from northern Louisiana and Carthage field in Texas, is expanding into the Louisiana Gulf Coast area as a source of gas supply for future requirements.

The company has acquired controlling interest in Louisiana Natural Gas Corp. and is planning to application next year to the Federal Power Commission for authority to build a line connecting this southwest Louisiana company with its own system.

Plans for future gas supply and other activities of Texas Gas Transmission were outlined recently in New York by W. T. Stevenson, executive vice president, during a showing of the company's new film on the advantages of gas as an industrial fuel.

Stevenson pointed out that Texas Gas Transmission had opened a gas-supply office in Shreveport under H. L. Mann, vice president. Mann was formerly president of Memphis Natural Gas Co. which in April 1948 was merged with Kentucky Natural Gas Corp. to form Texas Gas Transmission.

Organized last year.—Louisiana Natural Gas Corp. was organized last year and acquired a former Reconstruction Finance Corp. gas line built during the war to serve industrial consumers in the Southwest Louisiana area. It also is interested in producing properties. The contemplated connecting line with Texas Gas Transmission would extend northeast about 288 miles to the Monroe area.

Texas Gas Transmission's new 26-in. line from Lisbon, La., to Middletown, Ohio, has been placed in operation, and the company is now building four remaining compressor stations to bring the entire system up to full capacity of more than 660 million cubic daily, including about 400 million cubic feet daily in the new 26-in. A 20-in. line from Lisbon to Carthage was completed in March.

Gas from the new line is purchased under 20-year contracts in Carthage field and from Texas Eastern Transmission Corp. at Lisbon. Requirements for the remainder of the system are met mainly in northern Louisiana under contracts held by the old Memphis system, some of which expire in 1953.

Increased demand. — Stevenson mentioned the prospects of greatly increased gas demand through the area served by the company in the north-central section of the country. To meet its peak-load problem, the company has undertaken a campaign to sell more gas to industry on an interruptible basis.

The company official also said that underground storage also has been most helpful in this connection. Texas Gas now has a storage field near Oaktown, Ind., in operation since 1945, and is developing an additional storage field in Indiana expected to be in operation in 1951. Three other storage fields are being negotiated.

Carbon-Black Production

WASHINGTON. — Production of carbon black in 1949 declined 6 per cent to 1,223,636,000 lb., the U. S. Bureau of Mines reported last week. Sales declined 10 per cent during the year to 1,125,410,000 lb., and producers' stocks during the period increased by 98,218,000 lb., to 216,461,000 lb.

Production dropped in all reporting states except New Mexico. Production in Texas, which produced 71.5 per cent of all carbon black in the country during 1949, declined 3 per cent. Contact-black production decreased by nearly 50,000,000 lb., and furnace black by 25,000,000 lb., the bureau reported.

Average yield of carbon black from natural gas declined slightly to 2.38 lb. per 1,000 cu. ft. The carbon-black industry consumed 427,892,000,000 cu. ft. of natural gas, and in addition, 72,387,000 gal. of liquid hydrocarbons was consumed compared with 44,600,000 gal. in 1948. Sixty-four plants were operating during 1949.

Texas Gas' Income Up

NEW YORK.—Operating revenues and income in April, the first full month of operations following completion of its expanded pipe-line system, rose substantially, Texas Gas Transmission Corp. announced last week.

Net income for the month equaled $536,000, more than three times the $169,000 in the same month last year. Operating revenues during the month were $2,772,000, compared with $812,000 in April 1949.

W. T. Stevenson, executive vice president, pointed out that these comparisons reflect for the first time the full performance of the firm's integrated Texas-to-Ohio pipe-line system.

Gross revenue from sale of gas for the 4 months ended April 30 was $8,674,000. Net income for the first 4 months of this year aggregated $1,110,000, Stevenson said. These earnings are not indicative of normal earnings, however, due to the fact that deliveries at Middletown, Ohio, the northern terminus of the new pipe line, were not begun until February 9, and lower priced gas under the firm's Carthage field contracts did not become available until late March after completion of the 20-in. line into that field.

Virginia Proposal O.K.'d

WASHINGTON. — Federal Power Commission has authorized Virginia Gas Transmission Corp. to construct and operate a measuring and regulating station for sale and delivery of natural gas to Virginia Gas Distribution Corp., for resale to Strasburg Lime Co.

The station, to cost, $6,500, will be located on Virginia Gas Transmission's main line near Strasburg. Annual deliveries wil range from 98,000,000 cu. ft. in 1950 to 148,500,000 cu. ft. in 1953.

Wants Compressor Station

WASHINGTON.—Arkansas Louisiana Gas Co., Shreveport, is seeking Federal Power Commission authority to construct and operate a compressor station near Blanchard, La., which would bring natural-gas service to additional consumers in Central Arkansas, and make additional gas available to the firm's present customers.

Natural Gasoline

Buses Use Propane

WICHITA.—Wichita Transportation Co. has put two city buses into service which burn propane instead of gasoline, and are the first of their kind in the United States, according to company officials.

The buses are equipped with 180-hp. engines, and carry 103-gal. fuel tanks. Higher operating efficiency and a cut in maintenance and operating costs are expected, according to John Ebinger, vice president and general manager of the company.

Lodi Gas Plant Sold

BARTLESVILLE, Okla.—Phillips Petroleum Co. has sold its Lodi, Tex., natural-gasoline plant in Northeast Texas to Breckenridge Gasoline Co.

The Lodi plant, near the Louisiana border, was placed in operation in 1937, and was the only plant operated by Phillips in the East Texas-Louisiana area.

The plant's rated capacity is 34,000 gal. daily.

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REFINING

Catalysts Research

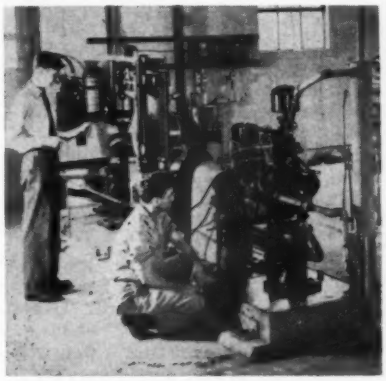
Additives, solvents also under study at plant

STAMFORD, Conn.—Research work on fluid catalysts, new solvents, and additives for drilling mud and lubricating oils is being carried on at the research laboratories of American Cyanamid Co. here.

Prominent among products serving the petroleum industry are a new drilling-mud additive, an oxidation inhibitor, and silica-magnesia cracking catalysts, in varying stages of investigation or evaluation. A new blend of drilling-mud compounds controlling viscosity and water loss has passed laboratory and field tests and is now entering large-scale field evaluation.

The new additive, as yet unnamed, contains polymers of acrylonitrile. It has performed satisfactorily in one drilling well in West Texas and is now being compounded in sufficient quantity for further field testing throughout the country.

A large number of lube-oil additives are under study, both in the laboratory and in standard engine tests. Evaluation of one agent, recently discovered, shows that it holds back oxidation in a lubricating oil practically to zero. Various detergents are undergoing tests, particularly as used in high-sulfur fuels. Inhibitors of bearing corrosion and compounds counteracting oxidation promotion by suspended metals in oils are also under study.



ADDITIVES TESTED.—Preevaluation of chemical additives for lubricating oils is carried out in small production-type engines like the one above at the Stamford, Conn., research laboratories of American Cyanamid Co.

An additive blend for heavy-duty oils, to be added in varying quantities to meet the new Military 2104 specifications, will soon be in commercial production. Other studies of additives and oils for Arctic use are under way in a low-temperature engine laboratory. Other research along this line concerns the use of certain resins for pour-point depressants, a field the company has not yet entered commercially.

Originator of the micro-sphere catalyst, the company now provides about half of the fluid cracking catalyst now used in the petroleum industry, say representatives. In this

NELSON REFINERY-CONSTRUCTION INDEX

Appears in the first issue of each month.
Explanation—Cost-imating No. 61, December 15, 1949, pages 91, 92.
Compiled by W. L. Nelson—Refinery Consultant—Tulsa.
Indexes of Individual Equipment Items—January, April, July, October.

INDEX (1946 = 100)

	1947	1948	1949	Feb. 1950
Centrifugal pumps	109.0	120.0	118.9	123.7
Reciprocating pumps	128.5	138.1	144.6	139.6
Compressor	114.0	128.0	120.0	117.0
Engines	109.0	120.0	115.6	113.2
Motors	110.0	112.7	114.0	120.0
Transformers	116.0	116.0	116.0	116.0
Instruments	113.0	120.0	122.0	123.1
Miscellaneous equipment average	114.2	122.1	121.6	121.8
Materials component	122.4	139.5	143.6	145.2
Labor component	113.5	128.0	137.1	140.3
Refinery construction index	117.0	132.5	139.6	142.3

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field, laboratory and plant investigations of silica-magnesia and other catalysts are continuing, with prospects for new improved grades considered favorable.

A.S.M.E. Meeting Set

NEW YORK.—Plans are being completed for the twenty-second national conference and exhibit of the Oil and Gas Power Division of the American Society of Mechanical Engineers, which will be held in Baltimore June 12-16 at the Lord Baltimore Hotel. A. S. M. E. headquarters announced here last week.

Important information in the diesel-power field will be discussed during the program of lectures, panel discussions, and technical sessions.

Among new information which will be discussed at the conference will be the first public report on the design features of a unique radial diesel engine built by Nordberg Manufacturing Co., Milwaukee, and test data on the new Berry hydraulic transmission. A lecture series on corrosion will also be given during the meeting.

Fuller's Earth Output

WASHINGTON.—Output of fuller's earth in 1949 totaled 320,906 short tons, valued at $5,199,642, the U. S. Bureau of Mines reported recently. This shows a slight increase over the 5-year average of 317,435 tons from 1945-49.

Consumption of fuller's earth in mineral-oil refining in 1949 was 151,353 tons, and comprised 47 per cent of the total production. Absorbent uses consumed 69,070 tons, 22 per cent of the total; insecticides, 37,342 tons, or 12 per cent; rotary-drilling mud, 30,411 tons, or 9 per cent; vegetable-oil refining, 19,806 tons, or 6 per cent; the remainder was used in other filtering and clarifying, binders, and other unspecified uses.

Rotary-drilling mud was the only use that showed an increase over 1948.

Process-Heating Seminar

TULSA.—The first annual process-heating seminar, sponsored by the John Zink Co. in the interest of better engineering and operating practices in refineries and chemical plants, will be held at the company's plant here June 10. Discussions will feature process heating and process-heat conservation.

Robert Reed, chief engineer of the Zink firm, will direct the seminar, and John Zink will be host.

Papers to be presented include: "Metallurgy for High Temperature—High Sulfur Process Conditions," by Francis Fahrenwald, Fahralloy Corp., Harvey, Ill.; "Performance of Thermal Poly Trans-Economizers," by J. H. Smith, chief process engineer, Continental Oil Co., Ponca City, Okla.; and "A New Approach to Design for Radiant Heat Transfer in Process Work," by Reed.

Carter Refinery Runs

TULSA.—Carter Oil Co.'s refinery at Billings, Mont., which was put in operation last year, processed a daily average of 13,700 bbl. of crude during the last 7 months of 1949. Capacity of the facilities is 20,000 bbl. daily.

The company's old Billings plant averaged 9,000 bbl. daily during its 5 months of operation that year. Carter's Cut Bank, Mont., refinery averaged 3,000 bbl. daily during 1949.

Oil Samples Analyzed

WASHINGTON.—A new report, "Analyses of Crude Oils From Some Fields of Southeastern United States," has been released by the U. S. Bureau of Mines. Compiled by O. C. Blade and E. L. Garton, petroleum chemists, the report analyses 51 samples of crude petroleum from Alabama, Florida, Kentucky, Mississippi, Tennessee, and Virginia.

Copies are free, and requests should be directed to the Bureau of Mines, Publications Distribution Section, 4800 Forbes Street, Pittsburgh 13, referring to Report of Investigations 4687.

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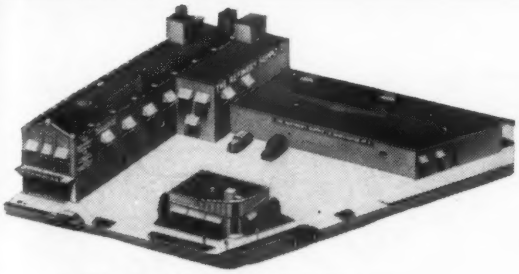

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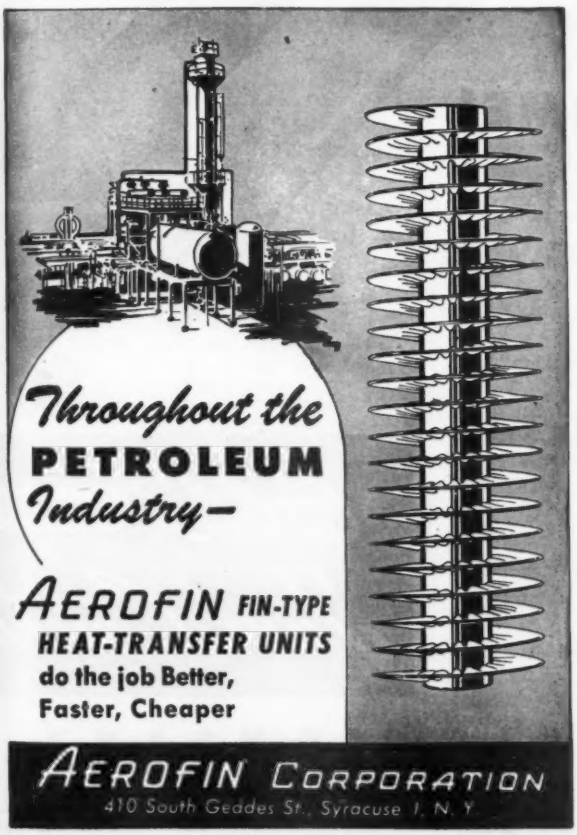

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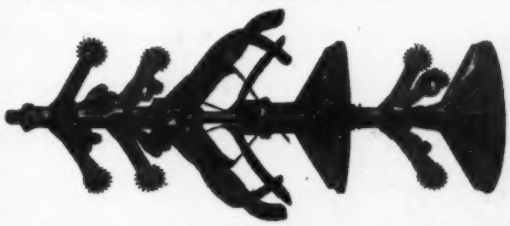

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Among the Drilling Contractors

Two Companies Awarded New Alberta Contracts

General Petroleums, Ltd., Calgary, will drill 2, and Arrow Drilling Co., Tulsa, 1 of the 3 new wildcat tests which A. B. Bailey Co., Ltd., and associates are starting in Alberta Province, Canada. The former company has the contracts for 1 Linaria, LSD 11, 23-61-27w4th, a 5,300-ft. Devonian test, in LSD 11, 23-61-27w4th, in the Linaria area, 53 miles northwest of Edmonton, and 1 Morningside, a projected 7,200 to 7,300-ft. test, in LSD 3, 14-42-27w4th, 9 miles southwest of Ponoka and 107 miles northwest of Calgary.

Arrow Drilling Co.'s contract is for 1 North Stettler, a 5,400-ft. test, in LSD 16, 16-39-19w4th, 2½ miles northeast of Stettler, 100 miles northeast of Calgary. The latter is about 7 miles northeast of the Stettler Devonian field.

Dellinger Quits Manning To Initiate Own Company

D. D. Dellinger, who, since November 1, 1948, has been associated with Fred M. Manning, Inc., Denver, as vice president in charge of finances, has resigned the latter position to enter the drilling contracting business for himself. With his son, he has organized the Dellson Drilling Co. His new company also will have headquarters at Denver.

Prior to his connection with Fred M. Manning, Inc., Dellinger was vice president of Continental Supply Co., Dallas. K. E. Saltgaver, treasurer of the former company, is assuming his duties in that organization.

Webster Adds Two Rigs To Increase Activities

Webster Drilling Co., Tulsa, has acquired 2 additional rotary rigs, making a total of 4 rigs the company now owns. One of the new rigs is an Emsco 500; the other is a Unit U-15. All are now running in Oklahoma.

Expansion of the company's operations has necessitated removal of its Tulsa offices from the Court Arcade building to the Oscar Howard building, where larger and more adequate working facilities are provided.

The company also recently enlarged its activities with the addition of Virgil Fleming, previously with Larkin Packer Co. at Tulsa for 5 years, to its official personnel as contact representative.

Contracts Awarded for Three Stanolind Wells

Contracts have been awarded by Stanolind Oil & Gas Co. for three additional tests to be drilled in the North Alma, Sholem Alechem and Velma area of Stephens County, Oklahoma. Zephyr Drilling Co. has been awarded the company's 1 Edwards, 4-1s-4w, a 5,000-ft. test located north of the North Alma pool. Taber & Colman, also of Tulsa, got 9 Moss, 35-1n-5w, 5,400-ft. test in the nearby Velma area. Noble Drilling Co. will drill 18 Goodwin, 2-1s-4w, 5,400-ft. test in the north part of the Sholem Alechem pool.

Coastal Gets Contract For Nevada Deep Test

Coastal Drilling Co., Los Angeles, has been awarded the contract to drill Nevada's first deep test. The wildcat, projected to a depth of 7,500 ft., will be drilled for Standard Oil Co. of California and Continental Oil Co., joint operators. Location of the test, designated as 1 Meridian Unit, is in 31-16n-56e, southwestern White Pine County. Coastal Drilling Co. is the Pacific Coast affiliate of Fred M. Manning, Inc., Denver.

C. H. Withers Drilling Co., Lloydminster, Sask., Canada, has been awarded the contract for a wildcat test which Genalta Holdings, Ltd., will drill in the Provost area, 180 miles northeast of Calgary in East Central Alberta Province. The location is about 9 miles from the Saskatchewan Province line.

Austin Stewart Drilling Co., Shreveport, has a 6,000-ft. contract for a wildcat test to be drilled for Roy L. Fisher and B. A. Hardey at 1 Zenoria, 27-8n-4e, a mile south of Blade, Catahoula Parish, Louisiana.

Montgomery Drilling Co., El Dorado, Ark., is drilling for Don Montgomery and associates at 1 Nebo, a wildcat test in 2-8n-4e, 3 miles west of Manifest, LaSalle Parish, Louisiana.

Ike Taylor, Lewistown, Mont., contractor, is undertaking a deep test in the shallow, Morrison sand pool he

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has been developing for his own account in the area about a mile south of the main production of the Mosby Dome, on the Cat Creek Anticline, Petroleum County, Montana.

Newman Brothers Drilling Co., San Antonio, is moving a rig to the Clay Creek dome in Washington County, Texas Gulf Coast, where it will drill a 5,000-ft. test as the contractor and joint operator with Alaska Steamship Co. The test, 1 William Janner, is located in the F. Perry Square League, on the south flank of the dome.

Johnson & Flesher Drilling Co., Oklahoma City, has taken a contract to drill a Simpson sand test for Kenneth A. Ellison near the east edge of the Oklahoma City field. The test is 1 Southland. Location is within the city limits, in 35-12n-3w.

Waggoner - Williams Drilling Co., Oklahoma City, is starting a 6,000-ft. Wilcox sand test for David Warsaski and associates at an outpost location southwest of the Coon Creek pool, northeast of Arcadia, Oklahoma County, Oklahoma. The test is on the Lambeth lease, in 22-14n-1w.

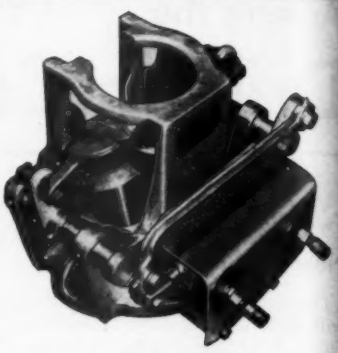
Ray & Harris Drilling Co., Dallas, has been awarded the contract for a test, 1 Sampson, which Sun Oil Co. will drill in Section 9-98, H&TC Survey, ½ mile southwest of Clairmont, Kent County, Texas.

Wolfe Drilling Co., Tulsa, has moved a rig to a location in 27-10n-1e, 2 miles west of Newalla, Cleveland County, Oklahoma, where it will drill a 6,300-ft. test for Gulf Oil Corp. and Faultline Oil Corp. This wildcat, 1 Wilson Estate, is about 5 miles from any production.

Pioneer Drilling Co., Casper, has a contract to drill a 5,000-ft., Weber sandstone test for Seaboard Oil Co. on the Massadona prospect, southern Moffat County, northwestern Colorado. The test has been designated as 63-12 Government. Location is in 12-3n-100w.

Dewey Price is the contractor on a deep wildcat test which Ralph Fair of San Antonio and Jack Woodward of Dallas are starting on the Wayne Creek Structure, 6 miles north of Savoy, Blaine County, Montana. Location is in 3-32n-24e. Immediate objective is the Madison lime, although the hole may be carried to the Devonian and possibly the Ordovician. Rotary tools are being used.

Prince Drilling Co., Houston, is nearing contract depth of 10,000 ft. on the wildcat test, 1 Skrabanek, it is drilling in the Day Land & Cattle Co. Survey, 1½ miles northwest of the Danbury Dome, Brazoria County, Texas Gulf Coast.



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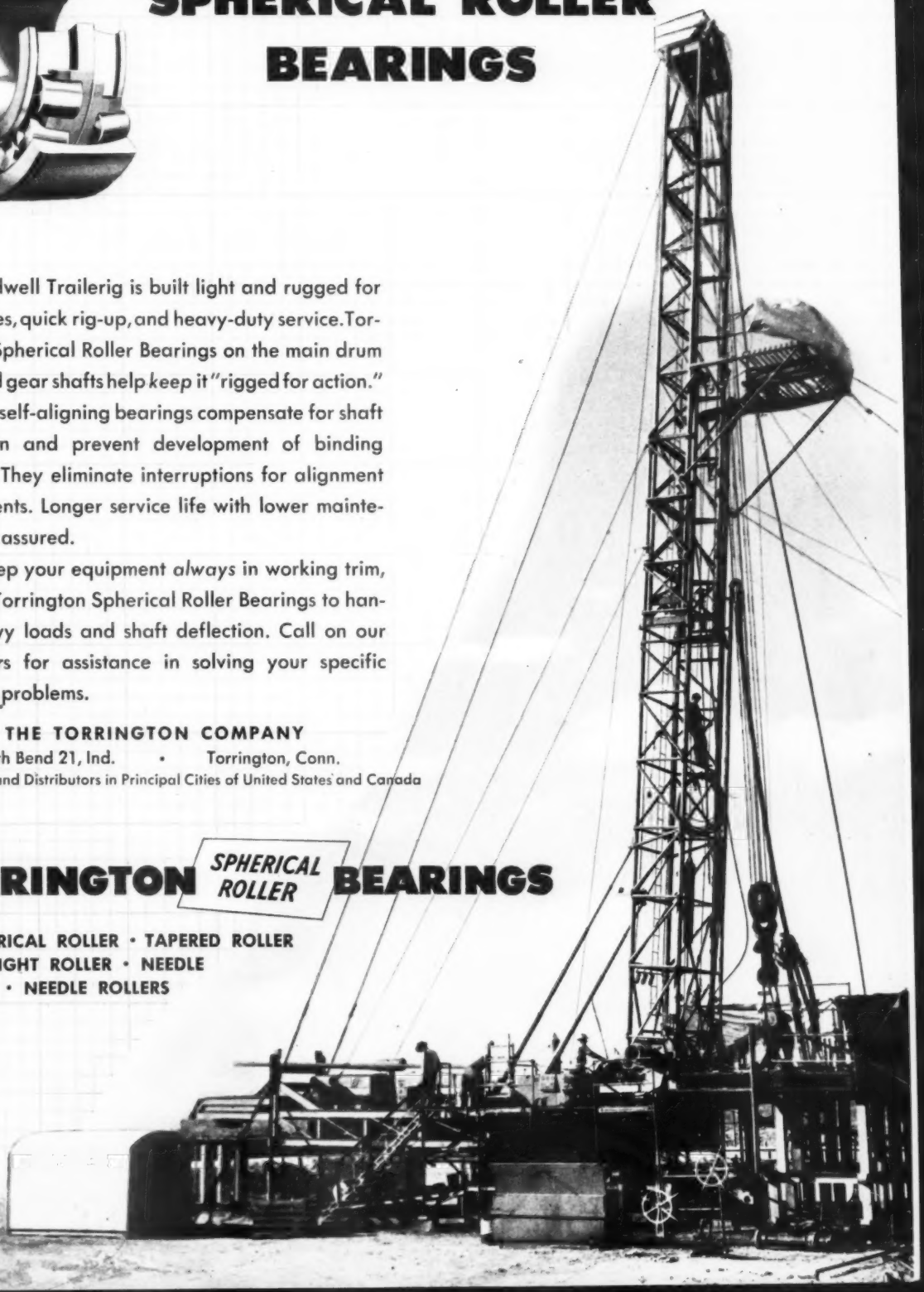

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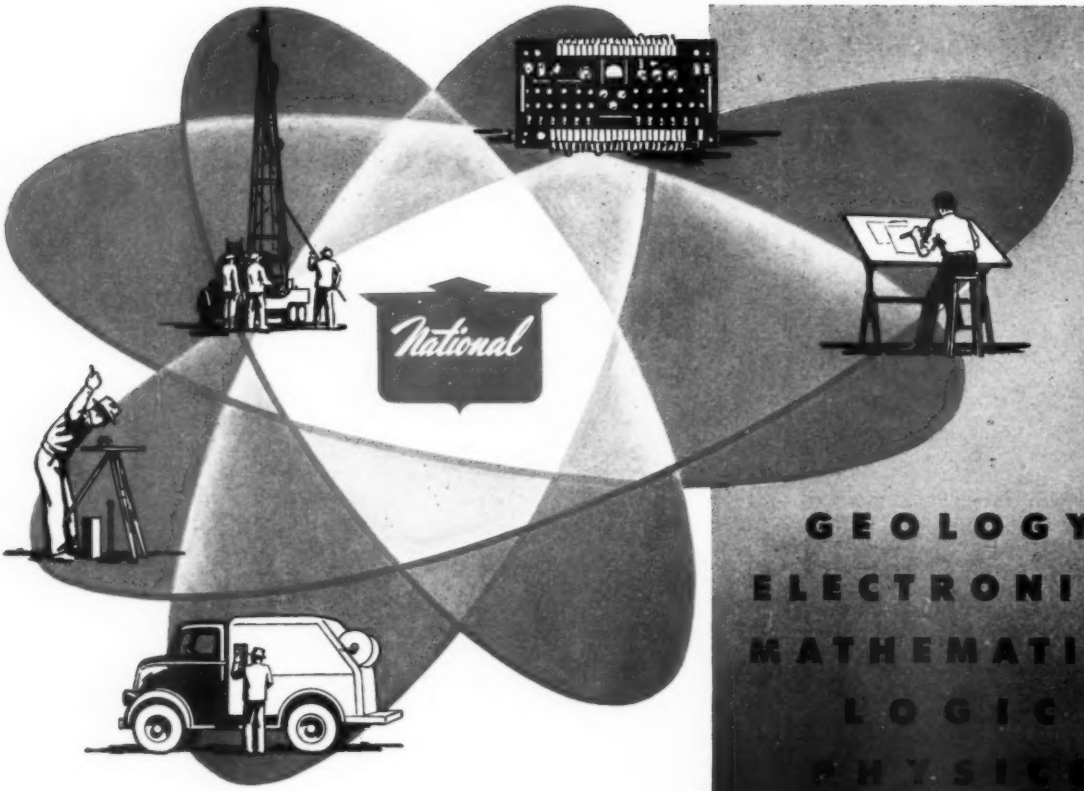

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Trends in Electric Log Interpreting

AMONG other signs of increased emphasis on quality in exploration science, are certain important trends in the field of interpretation of electric logs. It started with major companies, but independents and smaller companies are now developing their own method of catching up.

First the larger companies began to develop electric-log-interpretation experts—men who specialized in just that kind of work. Then the larger companies found that wasn't enough, so they added another feature. They began to hold company conferences in various areas. These conferences usually included geologists, production men, and reservoir engineers. An outside expert would give a series of special talks on interpretation before the group, over a 3 or 4-day period, ending with discussions of specific logs and problems with the men involved.

Many of the medium-sized companies found this second scheme practical and not too expensive for their operations, so they began to follow suit. Now a more recent development is the sponsoring of a series of lectures by some group within a local geological society. Independents, consultants, or major-company men can attend these sessions for a reasonable fee per man, depending on the number interested. An outside expert comes in, fully equipped with lantern slides, large illustrations, type logs, etc., and holds about a 4-day session of lectures, into which is packed an intensive study of the whole field of electric logging.

How fast these ideas are spreading can be judged by the fact that one consultant alone, within the past 3 months, has held 4-day sessions for six different groups, with a total attendance of about 350 geologists, reservoir engineers, and production men.

The popularity of these courses is the best evidence that developments in interpretation have far outrun the ability of the average geologist or engineer to put them into every-day practical use. But the experts are surprised to find that over and over they are asked questions about what they had considered rather simple fundamentals. Evidently the experts had been getting dangerously far ahead of the every-day users. For instance, here are a few of the questions that have been asked repeatedly:

1. Why do some formations with very high resistivity produce water, while other formations with the same high resistivity produce oil or gas?

2. Why do some formations with very low resistivity produce water, while other formations with the same low resistivity produce oil or gas?

3. Why do some formations with very high resistivity produce nothing?

4. Is it possible to interpret fluid content of thin porous reservoir formations from the resistivity curve?

5. What is the effect of various mud properties on both resistivity and S.P. curves?

6. Numerous questions about "lag" on the lateral curve indicate a complete misunderstanding of the basic properties of the lateral curve. On the other hand, a correct understanding of the true characteristics of the lateral will permit vastly improved interpretation of both thin and thick beds.

7. On the S. P. curve, why is the S. P. value so low on highly permeable sands that are good producers?

8. On the S. P. curve—why do you get such big "kicks" on limestones, dolomites, and on hard tight sands that will not produce?

9. On both S. P. and resistivity curves, is it possible to distinguish limestones or dolomites from hard sands?

10. Is it possible from S. P. curves to establish a general rule for picking tops and bottoms of sandstones or limestones, and then estimate how much effective pay there is in the interval?

11. On the S. P. curve, why do you sometimes get good wells out of a small "kick" and dry holes out of big "kicks"?

12. Why do you get a flat S. P. curve across all beds when you have a salty mud?

13. Why do you have a flat S. P. curve when you log in a fresh-water section with a normal mud?

The logging experts also say there is lack of understanding that logging is similar to gravity and magnetic geophysical work, in that, with some modifications, a self-potential property of the earth is being measured. Therefore it is generally the anomalies, the small deviations from normal that are significant, not the big things. *Charles J. Deegan.*

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

WEST TEXAS.—Placid Oil Co. announced a wildcat projected to 8,100 ft., or to the pre-Cambrian, for southern Dickens County. The test is to be the 1 S. W. Hughes, SW SW 185-L-H&GN, which is about 3 miles southwest of Spur, and 14 miles due north of Caroline Hunt's Young discovery in Kent County. In Scurry County, west of Diamond M and northwest of Sharon Ridge Canyon fields, Stroube Oil Co. 4 Eiland, Section 146, bridged the existing gap when it completed for 650 bbl. of oil a day, on ¼-in. choke, from 6,657-6,751 ft. D. D. Feldman 2 Fuller established production midway between Fuller field of Scurry County and Cogdell field of Kent County. The 1,200-bbl. well is located in Section 703-97-H&TC.

ROCKY MOUNTAIN AREA.—Oil was recovered on drill-stem test in the Muddy sand at Trigood Oil Co.'s 1 C&NW RR, development in the new Glenrock field, Wyoming. Platte River Oil Co. has cemented casing for further testing after finding oil in lower Benton shales at its 1 Fuerst, wildcat near Fort Morgan, Colorado. Tests are not too encouraging for a commercial well at the California Co.'s 1 Unit, rank test in the Gusher area, Utah.

XUM

North Central Texas

Stonewall County Strike Flows Intermittently

WICHITA FALLS.—Stonewall County's Bend conglomerate discovery, C. L. Norsworthy, Jr. 1 C. D. Wiley, 44-G-Alice Stephenson Survey, made an 85-bbl. flow of oil in 1 hour when plug on casing was drilled, but later flowed 50 bbl. of oil in 3½ hours and died.

The well had total depth of 6,005 ft., drilled plug from 5½-in. casing set at 5,990 ft. and kicked off without swabbing. After cleaning, it was turned into tanks through 10/64-in. choke, gaging 85 bbl. of clean oil. A later test yielded 50 bbl. of oil in 3½ hours, when the flow ceased. The discovery is on a Phillips Petroleum Co. farmout. Jake Hamon and E. L. Cox, Dallas, hold a one-half interest.

In southern Stonewall County, Seaboard Oil Co. of Delaware 1 W. I. Martin, 4-U-T&P, 10 miles south of Aspermont, was drilling ahead below 6,290 ft. in Ellenburger dolomite. Top of the formation was called at 6,238 ft., on elevation of 1,718 ft.

Sun Oil Co. 1 Beulah Branch, 339-2-H&TC, was drilling ahead below 5,545 ft. in shale and sand. A 1-hour drill-stem test from 5,445-64 ft. recovered 15 ft. of lightly gas-cut mud.

Nolan County's prospective Fry sand discovery 2 miles east of Hylton, 1 S. B. Moore, SE SE 181-64-H&TC, being drilled deeper by Drilling & Exploration Co., flowed oil for 30 minutes at the rate of 6 bbl. an hour following a Hydrafrac treatment at 5,025-41 ft. The well had load oil swabbed off and was shut in overnight. When opened it flowed oil at the above rate. Operators were preparing to complete. The well was originally drilled to 5,831 ft. by Ryan, Hays & Burke as their 1 Moore, where it had some oil and salt water.

Bend conglomerate production has been extended 1¼ miles west of Sanders field of northern Montague County at W. H. Bryant 1 A. J. Cox Estate, Block 117, Belcher Survey, 5 miles south of Belcherville. The new well flowed 71 bbl. of 41°-gravity oil in 3 hours from pay at 5,854-66 ft., and was given a daily potential of 568 bbl. There are no dry holes between the 1 Cox and the field.

In Taylor County, Drilling & Exploration Co. and G. H. Brodie 1 Gamble, 7-18-T&P, 3 miles north of the same operators' 1-A McLean, recent Ellenburger discovery, had top of the Ellenburger at 5,365 ft. on elevation of 1,911 ft., and recovered 20 ft. of mud cut with oil on its first test, at 5,366-87 ft. A second drill-stem test from 5,374-5,400 ft., total depth, open 1 hour, had gas in 5 minutes, started flowing oil in 23 minutes, and during the remainder of the test flowed at an estimated rate of 25 bbl. of oil in an hour. The 1 Gamble is located 2½ miles west and slightly south of Merkel. Some observers believe it might prove to be a major extension to the same pay horizon as found in the 1-A McLean.

One-half mile west of the McLean discovery, Drilling & Exploration 1 J. L. McLean set pipe at 5,564 ft. Total depth was 5,584 ft., in Ellenburger topped at 5,548 ft. First porosity was called at 5,578 ft. A 2-hour test before setting pipe had gas in 3 minutes and sprayed oil for 22 minutes while pulling drill pipe. Recovery had not been reported.

Geochemical Surveys 2 Tom Largent, 1½ miles north of Merkel in Taylor County, ran a drill-stem test in the Caddo lime from 4,596-4,612 ft. Gas showed in 4 minutes and recovery was 2,960 ft. of oil and 245 ft. of heavily oil and gas-cut mud. Time on the test was not reported. Flowing pressure was 400 psi. and shut-in pressure 820 psi. Top of the Caddo was 4,599 ft., on elevation of 1,824 ft. Location is in Tract 9, Grimes County School Land Survey 148.

In southern Wise County, 1 mile north of Cottondale, Mid-Continent Petroleum Corp. 1 A. J. Livengood, Block 90, Matagorda County School Lands Survey, A-534, opened gas-distillate production from the Bend conglomerate. A 1-hour drill-stem test of the conglomerate from 5,319-33 ft. had gas in 4 minutes and recovered 90 ft. of distillate. Gas volume was 3,500,000 cu. ft. daily. Operators made electrical surveys, then set casing to 5,384 ft. for completion.

A dry hole has apparently defined production on the southeast side of the KMA lime area 1 mile southwest of Taylor Corner field, recently opened by Fain & McGaha. The company's 2-B Parker, Block 16, Palo Pinto CSL, ½ mile southeast of the discovery, was dry at 4,192 ft. A 1-hour drill-stem test from 4,092-4,110 ft. recovered 180 ft. of slightly gas-cut mud and 60 ft. of salty mud. A 1-hour test at 4,126-35 ft. recovered 20 ft. of slightly gas-cut mud, and final test from 4,134-51 ft. had 60 ft. of gas-cut mud.

NORTH TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Callahan County: McElroy Ranch Co. 1 G. W. Shults, Sec. 57, LAL Sur., 8 mi. NW Putnam, TD 3,820 ft., PB 510 ft., elev. 1,467 ft., pay 594 ft., pumped 2 bbl. of 28°-gravity oil a day, Caddo 3,445 ft., Lake sand 3,805 ft.

Clay County: L. T. Bunr 2 J. C. Lutz, T. F. Bates Sur., A-13, 6 mi. NE Joy field, 3 mi. SE Bluegrove, TD 6,313 ft., Caddo conglomerate pay 5,666-5,750 ft., pumped 130 bbl. of 42°-gravity oil in 13 hr., GOR 850 cu. ft.

Gulf Oil Corp. 1 A. R. Dillard, John McCown Sur., A-309, 4½ mi. SW Henrietta, 5 mi. E Ross field, TD 6,370 ft., elev. 933 ft., PB 6,028 ft., Mississippian pay 6,000-28 ft., IP flowed 151.8 bbl. of 43°-gravity oil a day, ¾-in. choke, GOR 698 cu. ft., TP 45 psi.

Eastland County: Isett, Watson & Heller 2 Osca Gage, Blk. 6, Geo. Click Sur. 971, A.52, 2½ mi. N Pioneer, 968 ft. E team's 1 Gage, TD 2,635 ft., Caddo pay 2,630 ft., pumped 14 bbl. of 38°-gravity oil aday.

Knox County: R. Clay Underwood 1 Lora Dell Haskin Wisdom, 216-A-BBB&C, 4 mi. N Goree field, 6½ mi. NE Goree, TD 1,707 ft., elev. 1,413 ft., pay 1,690-1,704 ft., pumped 52½ bbl. of 33°-gravity oil a day.

Taylor County: Sojourner Drilling Co. 1 W. W. Toombs, SE SE NE 5-18-T&P, 3 mi. SW Merkel, TD 3,490 ft., PB 2,971 ft., elev. 1,905 ft., top pay 2,659 ft., flowed 268.6 bbl. of 44°-gravity oil a day, ¾-in. choke, GOR 450 cu. ft., TP 50 psi.

Wise County: Signal Oil & Gas Co. et al 1 J. I. Gentry, SE SE Blk. 82, Lower Matagorda CSL Sur., A-534, ¾ mi. N Cottondale, TD 3,627 ft., elev. 792 ft., acidized Strawn limestone 3,570-3,627 ft., pumped 96 bbl. of 39°-gravity oil a day, GOR 450 cu. ft.

NORTH TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: R. C. Lipscomb 1 Cordie Melugion, Blk. 5, Lot 41, Clark & Plumb 3 mi. E Archer City, dry, TD 4,215 ft., water sand 3,828-51 ft.

Ted Weiner 1 H. Munchrath, Lot 45, Blk. 4, Clark & Plumb, 2 mi. SW Windthorst, dry, TD 4,000 ft.

Brown County: Lone Star Producing Co. 1 Ella M. Snyder, NE NE T. C. Duncan Sur., A-1133, 6 mi. SE Crosscut, dry, TD 3,080 ft., elev. 1,550 ft., Caddo 1,974 ft., Marble Falls 2,768 ft.

Clay County: Dillard-Waltermire, Inc. 1 T. C. Hammons, San Augustine University Sur., A-403, 3 mi. NE Joy, dry, TD 6,325 ft., elev. 1,004 ft.

Coleman County: E. S. Arm-Con Oil Corp. 2 W. R. Roberts, D. J. Holt Sur., 1½ mi. SW Burkett, dry, TD 2,177 ft.

Hill & Hill 1 T. J. Allen, 64-1-GH&H, 3 mi. SW Valera, dry, TD 3(306 ft.

Comanche County: Burdell Oil Co. 1 Mrs. Peak Kirk, Sec. 488, W. F. Stegall Sur., A-1421, 3 mi. E Sipe Spring, dry, TD 3,200 ft., elev. 1,465 ft., Marble Falls 2,585 ft., Burnett 3,075 ft., Ellenburger 3,183 ft.

Parker Bros. 1 Mrs. S. I. Pittman, 35-2-H&TC, 6 mi. NW DeLeon, dry, TD 3,372 ft., Barnett shale 3,201 ft., Mississippian 3,327 ft., Ellenburger 3,335 ft.

Sohio Petroleum Co. 1 Byrl Frazier, John Talbott Sur., A-941, 4 mi. E Spir Springs, dry, TD 3,058 ft., elev. 1,387 ft., Marble Falls 2,495 ft., Ellenburger 3,036 ft.

Cooke County: Luther Howerton and others 1 V. S. Jones, J. J. Arocha Sur., A-20, 10 mi. NE St. Jo, dry, TD 1,750 ft., elev. 826 ft.

Hood County: Mid-Continent Petroleum Corp. 1 Squaw Creek Cattle Co., P. S. Hughlett Sur., A-256, 10 mi. S Grandbury, dry, TD 5,576 ft., elev. 916 ft., Ellenburger 5,428 ft.

Jack County: H. G. & G. Drilling Co. 1 W. S. Amburn, N. B. Overley Sur., A-452, 5 mi. SE Jermyn, dry, TD 3,130 ft.

J. J. Lynn 1 Dora Shawver "A," F. E. Foster Sur., A-2193, J. N. Garrison Sur., A-240, 6 mi. NW Perrin, dry, TD 5,255 ft., elev. 1,164 ft., conglomerate 4,482 ft.

Jones County: Farris Oil Co. 1 Ada Jennings, Sec. 207, BBB&C Sur., 4 mi. NW Lueders, dry, TD 3,322 ft., elev. 1,618 ft., coal 1,844 ft., Flippen 1,860 ft., King sand 2,130 ft., reef 2,817 ft.

Thos. D. Humphrey 2 Mrs. R. Dunlop, 22-4-H&TC, 1 mi. W Avoca, dry, TD 3,360 ft., elev. 1,548 ft., coal and lime 1,961-67 ft., sand 2,370 ft.

McCullough County: H. H. Sides 1 B. A. Connell, H. Basson Sur. 594, 2 mi. NE Lohn, dry, TD 898 ft.

Nolan County: J. S. Michael 1 Gus Farrar, 196-1A-H&TC, 5 mi. NW Maryneal, dry, TD 7,519 ft., elev. 2,593 ft., Valera 3,190 ft., Noodle Creek 4,260 ft., Saddle Creek 4,480 ft., Flippen 4,588 ft., Cisco 4,932 ft.

Palo Pinto County: Zenith Petroleum Co. 1 John D. McClure, Sec. 1794, TE&L Sur., 5 mi. W Graford, dry, TD 1,862 ft. in shale.

Parker County: W. L. Hinds 1 Z. T. Wynn, Sec. 115, T&P Sur., 2 mi. W Springtown, dry, TD 4,710 ft., elev. 965 ft., Caddo 3,637 ft., Bend conglomerate 4,125 ft., black shale 4,170 ft.

Taylor County: S. B. Roberts 1 Margery Ray, Sec. 5, ELRR Sur., 15 mi. SW Merkel, dry, TD 5,634 ft., elev. 2,124 ft., reef 3,970 ft., Mississippian 5,552 ft., Ellenburger 5,603 ft.

Throckmorton County: Woodley Petroleum Co. 1 Higgs est., Sec. 2240, TE&L Sur., 3½ mi. SE Woodson, dry, TD 4,702 ft., Marble Falls 4,121 ft.

Wichita County: J. E. Gray Drilling Co. 1 W. H. McLean, Blk. 49, Red River Valley Lands, 5 mi. W Burkburnett, dry, TD 1,855 ft., oil show 1,849-55 ft.

Anderson Drilling Co. 1 H. C. Obenhause, MEP&P Sur., A-230, 12 mi. NE Electra, dry, TD 2,115 ft.

Young County: Fred R. Harrell 1 Mrs. Ruby Escue, Sec. 1591, TE&L Sur., 7 mi. W Olney, dry, TD 1,248 ft., sand with oil show 1,205 ft.

Ohio Fields

Third Prairie Township Gasser Has Good Gage

COLUMBUS.—Roy Stewart et al third gasser in Prairie Township, Holmes County, ½ mile east of the 1 Wengerd, gaged 564,000 cu. ft. and was shut in on casing at 607,000 cu. ft. after shot. On Bessie Clinage in Section 16, the Clinton was logged at 3,535-46 ft.

Ditch & Gerig 1 B. H. Brandt, Section 24, Congress Township, Wayne County, a north offset to the 1 Brinkerhoff, topped the Newburg at 2,908 ft. and at 2,978 ft. the gage was 489,000 cu. ft. The well will probably be acidized before completion.

The Stone Creek Brick Co. 1 C. E. Mizer, Lot 18, Jefferson Township, Tus-

carawas County, the third test to find a gas supply, made 70,000 cu. ft. in the Red Clinton at 4,547-87 ft., and was shut in at 115,000 cu. ft. 25 hours after shot. The rock pressure is 1,420 psi.

In Richville pool, M. B. Belden Co. 1 Nora Graber, Section 25, Perry Township, Stark County, made 150,000 cu. ft. natural and 784,000 cu. ft. after shot.

New starts are still running ahead of completions. Knox and Perry counties had 4 new locations each out of 24 from 13 counties. Cambridge field led in completions with 5 out of a total of 19.

Texas Gulf Coast

Bee County Wildcat Recovers Oil on Test

HOUSTON.—In the Tynan area of Bee County, Morris Canna, Texita Oil Co., and Alaska Steamship Co. are running pipe in the 1 Mary Shumbera, wildcat test in the Bee County School Land Survey 16, Abstract 102. Operators cored shale and sand with a slight odor from 4,181-84 ft. and sand with a show of oil from 4,184-87 ft. A drill-stem test was then run, using a ¼-in. choke, and recovery was 1,040 ft. of oil. An electric log was then run and operators are now preparing for completion attempt.

S. H. Howell is testing dry gas in the 1 Joe Dubrava, wildcat 10 miles northwest of Tynan, in Live Oak County. Operator perforated the interval 3,959-65 ft., and the well tested dry gas through a 3/16-in. choke, with tubing pressure of 1,400 psi. It is reported that there is some condensate being tested. The new producer is located in the Refugio County School Land Survey, Abstract 399.

In Old Ocean field, Brazoria County, J. S. Abercrombie Co. 20 BRLD, Chas. Breen League, has encountered gas shows at 11,235 ft., and at present the operator is reported to be going in with core barrel. Other shows around 11,000 ft. have also been reported, which is deeper than any previous production in the field. The well has a projected depth of 15,000 ft.

General Crude Oil Co. et al have set 5½-in. casing to 8,510 ft., through the 8,250-ft. pay zone in Nona Mills field, and is getting ready to make production tests at the 2 Kirby Lumber Co. The well is located approximately 3 miles southwest of Kountze and 1 mile southwest of the firm's 2 Nona Mills, which recently extended production 1 mile southwest. If the 2 Kirby is completed a producer, this would prove a field at least 2½ miles long.

Gas and condensate production is indicated 2 miles southwest of Magnolia, Montgomery County, at Superior Oil Co. 1 L. N. Kramer et al, Edward Taylor Survey A-554. On drill-stem test run at 10,905-25 ft., the well flowed an estimated 2,700,000 cu. ft. of gas daily, and recovered 600 ft. of 46.2°-gravity condensate. The test is now drilling below 11,008 ft.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCATS

Live Oak County: Gas discovery—Henderson Coquat 1 Wyatt Curry, AB&M Sur., A-53, 2½ mi. NE Coquat field, perf. 7,290-80 ft., TD 8,004 ft., 60,000,000 cu. ft. of gas, open flow, SITP 2,700 psi.

Oil discovery—James G. McGarrick, Trust, 1 Mary E. Sullivan, Simmons Subd., 7 mi. SW George West, TD 7,504 ft., perf. 6,805-17 ft., 56 bbl. of 31°-gravity oil per day, ¼-in. choke, CP 125 psi.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Chambers County: James S. Aber Trust 1 Garth Bros. et al, T&NO RR Sur. 68, A-488, 5 mi. W Stowell, dry, TD 9,022 ft.

Live Oak County: Dirks & Wood et al 1

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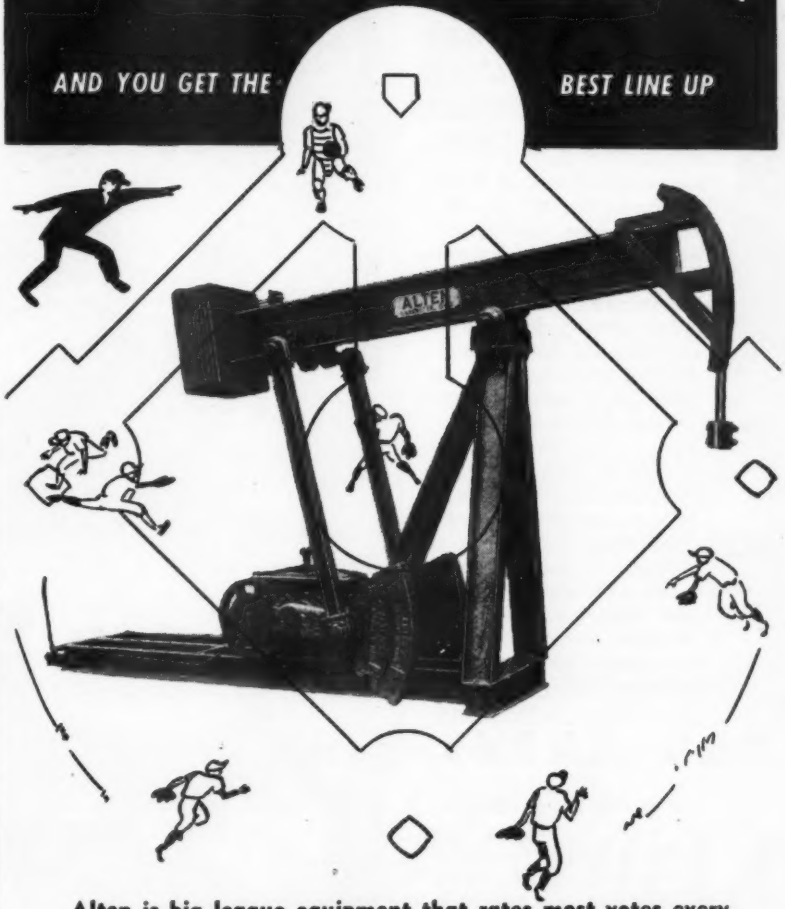

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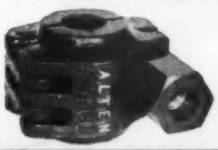

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Morey Bros., J. R. Johnson Sur., 4 mi. E Coquat field, 15 mi. NW Beeville, dry, TD 4,004 ft.

Matagorda County: Hankamer Investment Co. 1 Ike Laughlin, J. H. Updike Sur., A-339, 8 mi. SE Blessing townsite, dry, TD 9,595 ft.

Wilson County: L. G. Keppler 1 W. R. Briggs, J. W. Brown Sur., 5 mi. E Floresville, dry, TD 3,010 ft.

Oklahoma

Beckham County Wildcat Hits Heavy Gas Pressure

PROSPECTS of production at Wilcox Oil Co.'s deep wildcat test, 1 Dugger, C NW SE 12-10n-22w, north of Doxey, Beckham County, were revived when the well encountered strong gas showings while drilling below 11,055 ft. Entering a soft Conglomerate break at this depth the well started to "kick" and blew mud out of the hole necessitating closing of blow-out preventers. Gas flow during the blow was estimated at the rate of 2,000,000 cu. ft. per day. The formation was penetrated to 11,057 ft., where samples showed gas and fluorescence. After conditioning mud, operators started to deepen a few feet and will attempt a drill-stem test.

The gas kick occurred just after drilling had been resumed following a drill-stem test on an interval at 10,950-11,050 ft. The test, with tool open 68 minutes, resulted in a small showing of gas and yielded a recovery of 500 ft. of oil-cut mud and 4,600 ft. of oil-cut salt water.

Lincoln County, where a series of oil and gas discoveries has been made within recent months, has another prospective new pool in the area about 3 miles east and a little north of Sparks. The prospective discovery well is J. R. McLean 1 North, SW SE NW 9-13n-5e, which encountered good showings in Prue sand, topped at 3,505 ft. Two drill-stem tests were made. The first at 3,505-14 ft. yielded 95 ft. of free oil and 5 ft. of oil-cut mud. The second test, with bottom at 3,524 ft., had gas to the surface within 4 minutes and after 56 minutes started to flow oil at an estimated rate of 7 bbl. per hour. Recovery in the break-down was 390 ft. of oil and 150 ft. of oil-cut mud. There was no indication of water. Casing has been run to 3,508 ft. for production tests.

The Texas Co. 2 Watson, SE NE NW 9-12n-3e, which is opening a new Red Fork sand pool about 6 miles northwest of Meeker, also in Lincoln County, flowed 212 bbl. of oil in the first 9 hours following a Hydrafrac application in the pay zone at 4,694-4,709 ft. Of this production 142 bbl. was new oil. Gas production was estimated at 440,000 cu. ft. per day.

Oil production has been opened in the Perry gas sand on the southeast flank of the old Lucien pool, Noble County, where Bay Petroleum Co. 1 Ferguson, NW NW SW 34-20n-2w, flowed at the rate of 25 bbl. of oil per hour through casing and, later, 10 to 15 bbl. per hour through tubing. It has been shut in for connections. Total depth is 3,628 ft. with top of the sand, on which casing was run, at 3,602 ft. This sand has been encountered in nearly all wells previously drilled on the east and south sides of the field but never has been tested before. Generally, the sand has shown gas. Major production in the pool, discovered in 1936, is from Wilcox sand. The Viola lime, and Layton, Cleveland and Misener sands are productive in some sectors. Production of the Cleveland sand is gas.

Anderson-Prichard Oil Corp. has completed its 1 Lehmer, C NE NE 13-12n-2w, as the first oil well for the Southeast Munger pool, Oklahoma County. The well flowed 105 bbl. in the first 15 hours through ¼-in. choke from casing perforations at 6,065-99 ft. Bottom of hole is 6,225 ft.

A possible new pool or another important extension for the Sholem Alechem pool, Carter County, is indicated at Seaboard Oil Co. 1 Johnson, NW SE NE 14-2s-3w, where a 2-hour drill-stem test of a Pennsylvanian sand at 4,966-5,025 ft. yielded 90 ft. of heavily oil-cut mud with 10 ft. of free oil. Casing has been run to 4,949 ft. The location is nearly ¾ mile east and slightly south of the south tip of the Sholem Alechem pool in the Fox pool area.

OKLAHOMA WILDCAT FAILURES

Cotton County: J. B. Russell 1 Nelson, SW SW SW 6-5s-11w, dry, TD 2,006 ft., fusilinid lime 1,686 ft., Mergargel 1,860 ft., elev. 944 ft.

W. H. Spradling 1 Edgemon, SW SW NW 1-5s-10e, dry, TD 1,600 ft., sand 1,320 ft. and 1,412 ft., no shows.

Hughes County: Murta, Turpin et al 2 Spillman, SE NW NE 20-7n-9e, 1½ mi. S of E. Holdenville, dry, TD 1,040 ft., Wewoka 690 ft., first Calvin 800 ft., second Calvin 850 ft., third Calvin 863 ft.

Jefferson County: Sun Drilling Co. 1 Dennis, SW SW NE 10-6s-5w, dry, TD 4,252 ft., Hoxbar 1,590 ft., base Palo Pinto 2,138 ft., Arbuckle 4,061 ft., elev. 879 ft.

Kingfisher County: Foundation Oil Co. 1 Martin, C NW SE 1-17n-7w, 4 mi. NE of SW Dover, dry, TD 8,569 ft., Deer Creek 3,840 ft., LeCompton 4,233 ft., upper Oread 4,454 ft., lower Oread 4,553 ft., Lovell 4,800 ft., Haskell 5,074 ft., upper Layton 5,820 ft., lower Layton 5,989 ft., Hogshooter 6,186 ft., Checkerboard 6,272 ft., Oswego 6,483 ft., Prue 6,712 ft., Verdigris 6,742 ft., Morrow 6,818 ft., Marmaton 7,228 ft., Mississippi lime 7,266 ft., Woodford 7,766 ft., Hunton 7,790 ft., Chimney Hill 7,928 ft., Sylvan 8,096 ft., Viola 8,200 ft., dense 8,280 ft., Marshall 7,928 ft., shale 8,478 ft., second Wilcox 8,558 ft., elev. 1,085 ft.

Lincoln County: An-Son Petroleum Corp. 1 Wells, NE SW NE 10-13n-4e, 2 mi. S Gessman, dry, TD 4,417 ft., Hogshooter 2,756 ft., Checkerboard 3,120 ft., conglomerate 3,144 ft., Oswego 3,905 ft., Prue 3,947 ft., Inola 4,373 ft., Bartlesville 4,380 ft., elev. 910 ft.

Marshall County: Yandall Rogers 1 Drummond, S/2 NW NW 26-5s-6e, dry, TD 904 ft., Goodwin 216 ft., Arbuckle sand 664 ft.

Murray County: Floyd Scoggins et al 1 Tillery, NW SW NW 32-1n-3e, dry, TD 868 ft. in Pontotoc.

Noble County: Woods Drilling Co. 1 Gould, NW NW NE 11-22n-2w, 2¼ mi. N Fourdee, dry, TD 3,892 ft., Oread 2,735 ft., Avant 3,450 ft., Layton 3,783 ft., elev. 1,009 ft.

Osage County: Norbla Oil Co. 1 Osage, NW NW NE 26-24n-6e, 5 mi. W Naval Reserve, dry, TD 2,775 ft., Dewey 1,680 ft., Osage-Layton 1,710 ft., Hogshooter 1,870 ft., Checkerboard 2,100 ft., Big lime 2,265 ft., Oswego 2,410 ft., Mississippi chat 2,757 ft., elev. 860 ft.

Norbla Oil Co. et al., 1 Osage, NE NE NE 18-26n-5e, ¾ mi. N discovery, dry, TD 3,175 ft., Osage-Layton 2,290 ft., Hogshooter 2,385 ft., Layton 2,460 ft., Checkerboard 2,633 ft., conglomerate 2,672 ft., Big lime 2,757 ft., Oswego 2,810 ft., Prue 2,940 ft., Verdigris 2,970 ft., Skinner 3,012 ft., lime 3,040 ft., Inola 3,085 ft., Bartlesville 3,092 ft., Mississippi lime 3,150 ft., elev. 1,084 ft.

Seminole County: E. Sadler and Kingery & Patterson 1 Haning, SE NE SW 19-8n-7e, 1½ mi. S of E. Bowlegs, dry, TD 4,275 ft., lime 3,165 ft., Gilcrease-Cromwell 3,290 ft., base Pennsylvanian 3,570 ft., Mayes 3,840 ft., Woodford 3,920 ft., no Hunton, Sylvan 4,042 ft., Viola 4,133 ft., Wilcox 4,260 ft., elev. 936 ft.

Tillman County: S. D. Johnson 1 Thomas, NE SE NE 7-4s-18w, dry, TD 6,151 ft., Canyon lime 3,982 ft., no Arbuckle, elev. 1,146 ft.

S. D. Johnson et al 1 Hamill, NE SE SW 31-4s-15w, dry, TD 5,207 ft., Canyon lime 3,316 ft., Arbuckle 5,190 ft., elev. 1,088 ft.

S. D. Johnson 1 Wolfe, NE NE SE 36-3s-18w, dry, TD 6,032 ft., Canyon lime 3,498 ft., elev. 1,155 ft.

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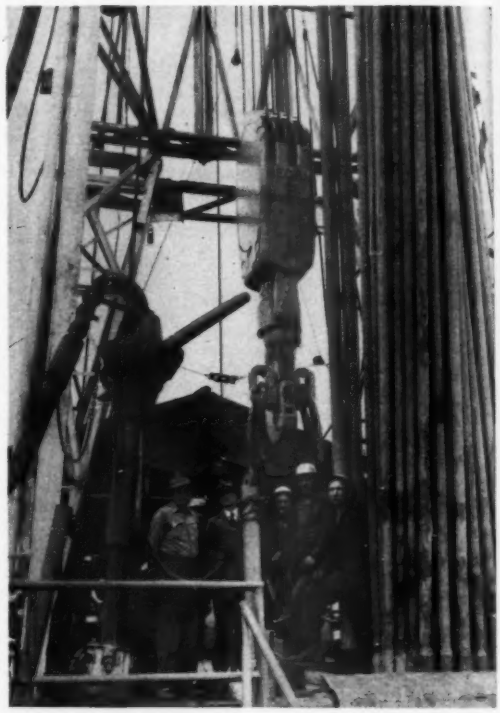

W. H. Black Drilling Co., Inc., of Midland, Texas, use a Regan 36-200 Traveling Block and No. 6 Combination Hook on their Rig No. 1 currently drilling near Snyder, Texas. Left to right: J. H. (Jimmie) Lowe, tool pusher; W. W. Parmley, driller; Marvin A. Weston, Regan representative; P. B. Pace, C. E. Moore and L. D. May, floormen.

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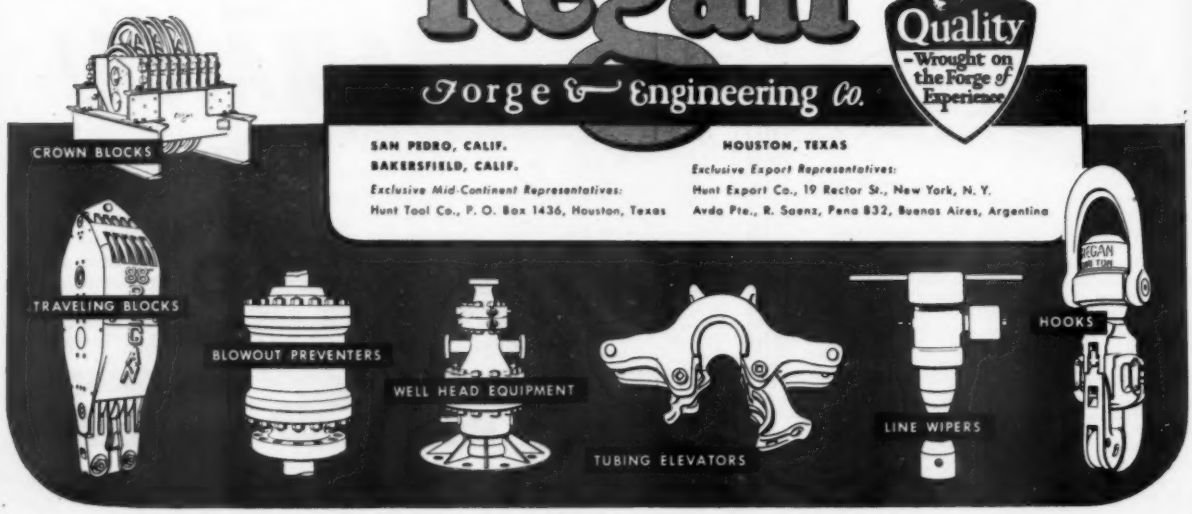


Kansas

South Nebraska Wildcat Testing Lansing Showing

EXTENSION of the Central Kansas Uplift trend of pools northward into southern Nebraska is in prospect at Alpine Oil & Royalty Co. and B. and R. Drilling Co. 1 Fischer, SW SW SE 33-1n-18w, where testing of good showings encountered in Lansing lime is being started. The well, located just across the Phillips County, Kansas, line in Harlan County, Nebraska, is 5½ miles north and slightly east of the Huffstetter pool, currently the most northerly production on the trend which extends in a northwesterly-southeasterly direction through Central and Western Kansas.

Lansing in the prospective Nebraska well was topped at 3,228 (—1,201 ft.). A 30-minute drill-stem test of a section carrying saturation at 3,318-28 ft. yielded 5 ft. of clean oil and 30 ft. of oil-cut mud. Hole was deepened to 3,450 ft., where 5-in. casing was run.

B. and R. Drilling Co. 1 Babcock, NE NE NE 27-1s-18w, a wildcat located about 3 miles northeast of the Huffstetter pool and about 2 miles to the south of the prospective Nebraska wildcat, also encountered oil showings in the Lansing-Kansas City, and is preparing to test. The formation was cut at 3,346 ft. (—1,223 ft.). Casing, run through the section to 3,521 ft., has been perforated at 3,474-78 ft., 3,466-68 ft. and 3,449-55 ft. Formation has been given a 500-gal. acid treatment. A previous drill-stem test of an interval at 3,410-15 ft. yielded only 5 ft. of oil-cut mud. Prior to running casing, hole had been drilled to the Arbuckle, but no showings of importance were obtained in that formation. Arbuckle was topped at 3,776 ft. (—1,606 ft.) and drilled to 3,827 ft.

Powell & Peters Drilling Co. got a recovery of 30 ft. of oil-cut mud in a drill-stem test of Arbuckle lime in its 1 Knop, SE SE NE 16-19-12, a wildcat located about a mile west of the Cheyenne View pool, north of Ellinwood, Barton County. Test was at 3,434-45 ft. with Arbuckle topped at 3,433 ft. Casing has been run to the top.

Confirming the recent discovery of the Smith-Denning pool in southeastern Graham County, Westgate-Greenland Oil Co. has completed its 1 Denning, SE SE SW 32-9-21, with a maximum potential (3,000 bbl. per day). This well, the second for the pool, is a north offset to the discovery well, 1 Smith, completed early in May with a potential of 1,981 bbl. per day. Production is from the Arbuckle, topped at 3,828 ft. (—1,555 ft.), 3 ft. higher than in the discovery producer. Total depth is 3,834 ft. with casing at 3,830 ft.

KANSAS SUCCESSFUL WILDCATS

Barton County: Alpine 1 Rusco, SW SW SE 8-19s-12w, 25 bbl. of oil per day from Arbuckle topped at 3,417 ft., TD 3,442 ft., elev. 1,865 ft.

Marion County: Deiter 1 Krch, NE SW NW 15-18s-4e, 10 bbl. of oil per day from Mississippi lime topped at 2,375 ft., TD 2,427 ft., elev. 1,452 ft.

KANSAS WILDCAT FAILURES

Barton County: Isern 1 Rzika, NW NW NE 20-17s-12w, dry, TD 3,518 ft., Heebner 3,114 ft., Lansing-Kansas City 3,215 ft., Arbuckle 3,489 ft., elev. 1,959 ft.

Keyes 1 Johnson, SE SE NW 6-19s-11w, dry, TD 3,423 ft., Arbuckle 3,396 ft., elev. 1,812 ft.

Butler County: Adair 1 Breinning, SW SW SE 7-23s-6e, dry, TD 3,291 ft., Arbuckle 3,280 ft., elev. 1,489 ft.

Ellis County: Pickrell 1 Rupp, NW NW NW 7-13s-18w, dry, TD 3,840 ft., Heebner 3,456 ft., Toronto 3,480 ft., Lansing-Kansas City 3,508 ft., Simpson 3,788 ft., Arbuckle 3,799 ft., show of heavy black oil on DST at 3,800-20 ft., elev. 3,152 ft.

Jones-Shelburne & Farmer 1 Schlegel, NE NE SW 36-15s-18w, dry, TD 3,489 ft., Heebner 3,138 ft., Toronto 3,153 ft., Lansing-Kansas City 3,185 ft., Sooy 3,457 ft., Arbuckle 3,481 ft., elev. 1,904 ft.

Graham County: B & R et al 1 Johnson, NE NE NE 2-9s-22w, dry, TD 3,840 ft., Heebner 3,398 ft., base Kansas City 3,648 ft., reworked Simpson 3,776 ft., Arbuckle 3,788 ft., slight stain of oil at 3,790-93 ft. and 3,800-02 ft., elev 2,205 ft.

Harper County: Falcon-Seaboard 1 Schupbach, SW SW NW 5-34s-9w, dry, TD 5,170 ft., Kinderhook 4,729 ft., Marmaton 3,854 ft., Viola 4,865 ft., Simpson 4,949 ft., Arbuckle 5,133 ft., elev. 1,325 ft.

Lyon County: Anderson et al 1 Ball, SW SW NW 23-18s-10e, dry, TD 1,614 ft., Kansas City 1,387 ft., elev. 1,245 ft.

McPherson County: Mallard et al 1 Blaine "B," SE SW NE 28-17s-1w, dry, TD 2,730 ft., Mississippi lime 2,670 ft., elev. 1,355 ft.

Rice County: Shira et al 1 Wilkins, SW SW SW 21-18s-6w, dry, TD 3,250 ft., Lansing-Kansas City 2,773 ft., elev. 1,697 ft.

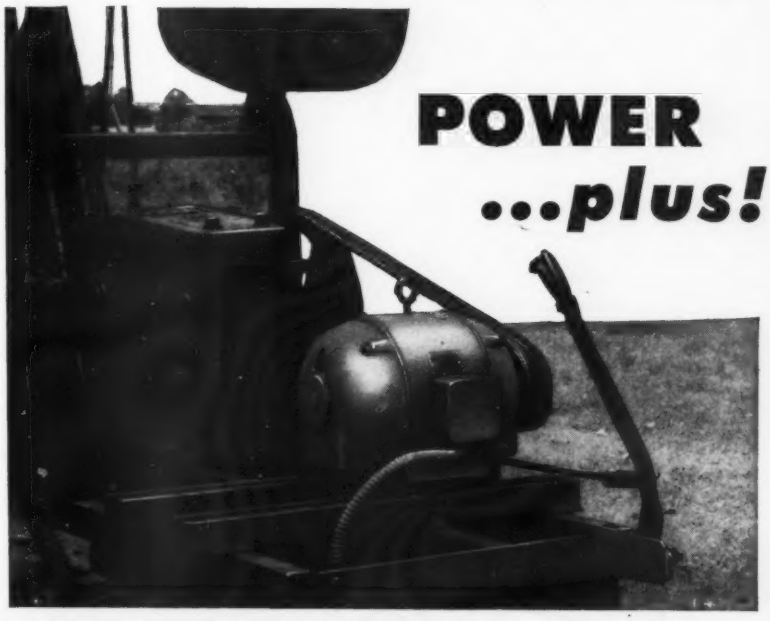
Scott County: Shallow Water 1 Harris, NE NW SE 25-18s-33w, dry, TD 4,795 ft., Lansing-Kansas City 3,910 ft., Mississippi lime 4,708 (?) ft., elev. 2,954 ft.

Sedgwick County: Dunne & Strait, NW NW SW 32-27s-4w, dry, TD 3,807 ft., Mississippi lime 3,761 ft., elev. 1,397 ft.

Stafford County: Johnson 1 Hamilton, NE NE SW 35-21s-11w, dry, TD 3,520 ft., Heebner 2,969 ft., Lansing-Kansas City 3,125 ft., cherty Sooy 3,407 ft., Viola 3,413 ft., Simpson shale 3,450 ft., Simpson sand 3,457 ft., Arbuckle 3,503 ft., elev. 1,749 ft.

EASTERN NEBRASKA WILDCAT FAILURE

Richardson County, Barada area: Stout-Hahn 1 Wenz, NW SE SW 1-2n-16e, dry, TD 2,565 ft., Hunton 2,498 ft. with slight show of oil.



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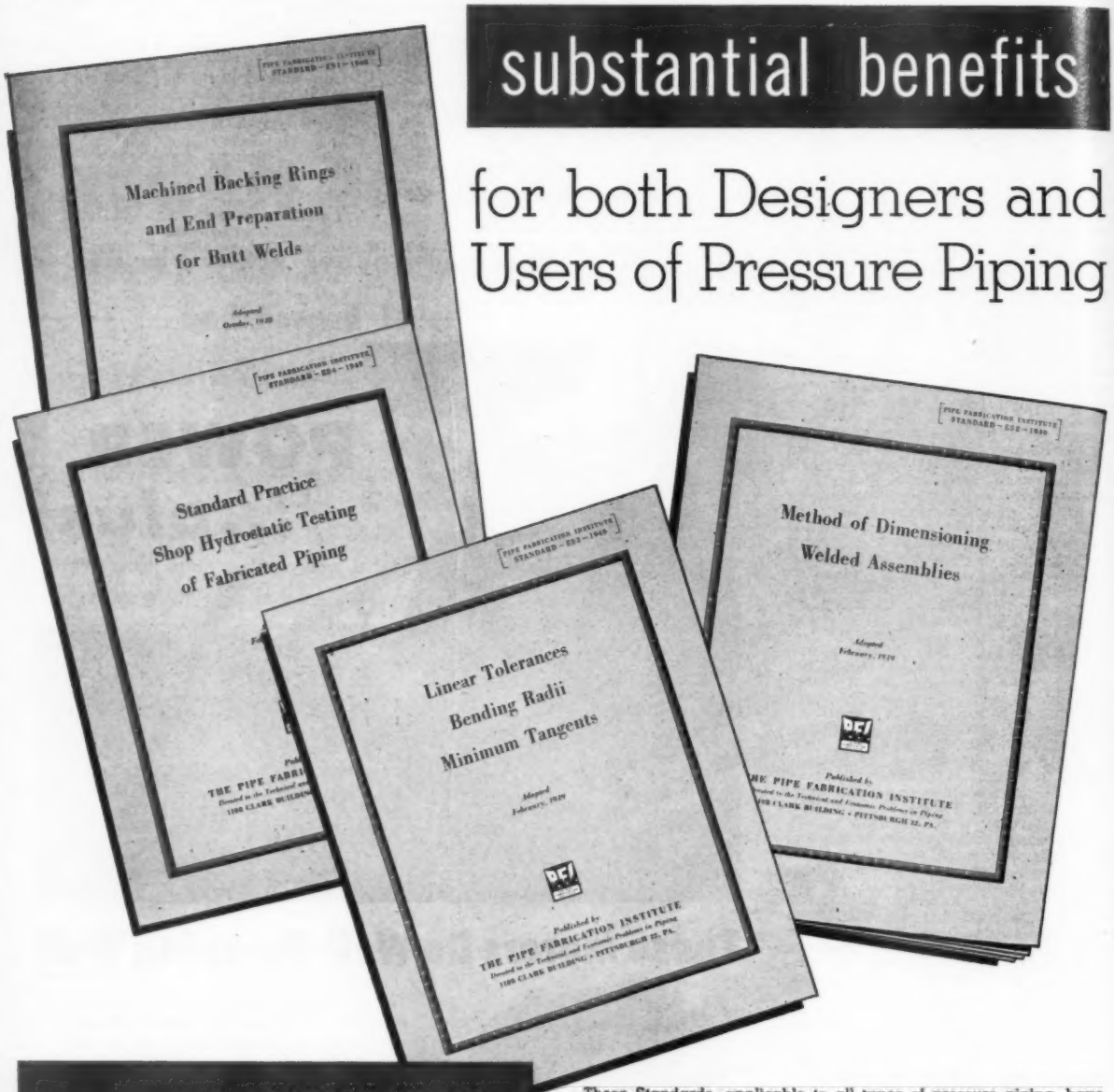
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California

"Grass-Roots" Prospect Reports Thick Oil Sand

LOS ANGELES.—A shallow, heavy-oil discovery appears to be in the making near Casaic in Los Angeles County. The wildcat, Macson Oil Co. 1 Radovich, reportedly logged 260 ft. of oil sand between 494-895 ft. When the operator attempted to wash the well with oil it started flowing mud and 19°-gravity crude. At last reports the well was shut in while a pumping unit was being moved in to make a production test. The well, located in Section 26-5n-17w, about ¼ mile west of Castaic, had been carried to a total depth of 3,494 ft. but was plugged back to 900 ft.

In North Cuyama Valley, Southern California Petroleum Co. was running casing at its northwest offset to the Hancock-Oceanic discovery in Section 10-12n-28w. Top of the Morales sand was called at 2,115 ft., with hole plugged back to 2,260 ft. after being drilled to 2,360 ft. Oil possibilities to the south of the discovery will soon be tested by Bishop Oil Co. The operator is grading roads for its 67-10 Chorum, a southern offset.

East Cuyama Valley is in line for another wildcats. Richfield Oil Corp. has staked location for its 1 Caliente unit in Section 18-10n-24w, near the San Luis Obispo-Kern county line. The test will be about ½ mile northwest of the Stubblefield property on which both Texas Co. and Independent Exploration Co. recently drilled unsuccessful tests.

In northern California, Standard Oil Co. of California was unsuccessful at its 2-1 Arbuckle in central Colusa County, where hole was carried to 3,100 ft. after the Cretaceous was topped at about 2,450 ft. Socal, however, is moving equipment to a second test some 2 miles southeast, the 2-2 Arbuckle Community in Section 12-12n-2w.

In Yolo County, Socal also abandoned its 1 Bemmerly unit after a drill-stem test at 2,748-75 ft. yielded mostly salt water. Located in the Dunnigan Hills area, Section 27-11n-1w, the wildcat topped the Capay at 2,026 ft. and drilled into the Cretaceous at 2,543 ft.

In Kern County, General Petroleum Corp. was preparing to move out at its deep test at Lost Hills. Spudded almost a year ago, the 33-11 Williamson was carried to a total depth of 11,553 ft. Testing of shallower pay zones proved all shows to be noncommercial. In the eastern part of the county, Atlantic Oil Co. failed at its wildcat south of the McFarland area. The test, 1 Del Fortuna, was carried to a depth of 6,850 ft.

Nevada's first deep test, and the first drilled by a major oil company, shortly will be underway. At last reports the contractor was rigging rotary for the wildcat, which will be jointly drilled by Continental Oil Co. and Standard of California. Designated the 1 Meridan, the test is in Newark Valley about 45 miles west of Ely in White Pine County. Location is SW, Section 31-16n-56e.

CALIFORNIA UNSUCCESSFUL WILDCATS

Colusa County, Arbuckle area: Standard Oil Co. of California 2-1 Arbuckle, 3-13n-2w, dry, TD 3,100 ft., elev. 174 ft.

Kern County, Poso Creek area: Oceanic Oil Co. 1 Wickham, 34-27s-28e, dry, upper Vedder 1,764 ft., TD 1,811 ft., elev. 906 ft.

Tejon Hills area: Star Oil Co. 5 Tejon, 2-11n-8w, dry, TD 542 ft., elev. 1,310 ft.

Tejon Ranch area: Standard Oil Co. of California 56 Tejon, 31-12n-18w, dry, Santa Margarita 2,415 ft., Fruitvale shale 2,491 ft., besalt 4,600 ft., TD 4,737 ft., elev. 647 ft.

Kings County, El Rico area: Hancock Oil Co. of Calif. 23-33 Crockett-Gambogy, 33-22s-21e, dry, TD 4,000 ft., elev. 195 ft.

Santa Barbara County, San Marcos area: L. W. Welch 3 Lazy R. G., 29-6n-29w, dry, TD 6,140 ft., elev. 785 ft.

Tulare County, Visalia area: Steele Petroleum Co. 1 Visalia, 18-17s-25e, dry, granite, 1,000 ft., TD 1,033 ft., elev. 323 ft.

Ventura County, Ojai area: Bankline Oil Co. 1 Dunshee, 19-4n-23w, dry, TD 4,786 ft., elev. 733 ft.

Mississippi

Wilcox Prospect Tested In SE Adams County

JACKSON.—Another possible Wilcox discovery for Adams County, Mississippi, has run casing and is waiting on cement at Plains Production Co. 1 W. C. Walker, 11-5n-2w, approximately 4½ miles southeast of South LaGrange field. This wildcat was drilled to a depth of 6,804 ft., Schlumberger log was run, and sidewall samples taken. A combination of sidewall samples and electric log indicate oil sands as follows: 6,490-97 ft., 6,500-03 ft., 6,594-98 ft., 6,603-06 ft. and 6,655-61 ft. (a total of 23 ft. new oil sand). Operators first plan to test the lower sand at 6,655-61 ft.

The most reliable marker in this section of the Wilcox in this area is the base of the Big shale which was topped at 5,948 ft. (—5,763 ft.), which is approximately 85 ft. lower than in the Barnett Serio 1 C. F. Engle et al, 11-5n-2w, approximately 1½ miles north and slightly west.

Production in Glen Aubin field, Adams County, seems assured of confirmation at the Barnett Serio-Petersen Drilling Co. 2 H. R. Jenkins, 19-5n-3w, approximately 1,900 ft. south of the field discovery. Oil sand was indicated on electrical log at 6,683-92 ft. with 4½ ft. net. Casing was run to 6,765 ft. and then perforated from 6,684-88 ft. No tanks have been erected and only estimates have been made of amount of flow to pits. Through a ¼-in. choke, the flow was estimated at 15 bbl. of 44°-gravity oil per hour, with tubing pressure of 550 psi. After flowing 2 hours the tubing pressure dropped to 400 pis. and leveled off. Operators are now waiting on tanks and completion gage.

In Clarke County, Alabama, The California Co. has staked location for a wildcat to be drilled on the Hatchetigbee Anticline, NE SE 1-7n-1w. It will be a Smackover test and projected depth is 12,500 ft.

MISSISSIPPI WILDCAT FAILURES

Madison County: Tip Ray-D. C. Latimer 1

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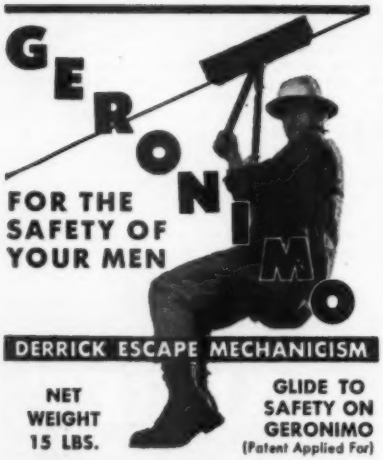

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William Howard, 8-10n-4e, dry, TD 8,520 ft.

Wilkinson County: American Republics Corp. 1 Crosby Lumber Co.-Foster Creek Corp., 20-4n-2w, dry, TD 7,447 ft.

Louisiana-Arkansas

Lincoln Parish Strike Opens Unionville Pool

SHREVEPORT.—Southwest Natural Production Co. opened Unionville field in Lincoln Parish upon completion of its 1 M. E. Colvin in 31-20n-2w. On elevation of 167 ft., top of the Cotton Valley formation was 8,020 ft., and top of the Vaughn section was 8,734 ft. On completion test, it flowed at the rate of approximately 160 bbl. of 56°-gravity distillate a day from perforations at 8,738-56 ft.

Midstates Oil Corp. completed its 1 Town of Haynesville, 30-23n-7w, as a possible link between Haynesville and East Haynesville fields of Claiborne Parish. Completion was from the "C" sand of the Smackover from 5,396-5,406 ft. Flowing through ½-in. choke, it gaged 229 bbl. of 39.5°-gravity oil a day.

Location has been reported for a new Claiborne Parish wildcat 2 miles west of Homer. The 7,000-ft. Smackover test is to be the 1 P. C. Wideman in 21-21n-7w, which is about 1 mile east of nearest production in the old Homer area. Two other Smackover tests have been drilled in that area. Gulf Refining Co. 1 Muslow in 31-21n-17w, was dry in salt at 6,855 ft., and the 1 Minnie Lowenberg, 18-21n-7w, was drilled to 6,614 ft. in 1947.

In Arkansas, McAlester Fuel Co. was building roads to location for a Smackover test in Spotsville field. The operation is the 1-A Ferguson-Ainsworth Unit, approximately EW NW 5-18s-18w.

C. H. Murphy Co. has made location in southeast Columbia County for its 1 Concannon, SE NE 29-19s-18w, which is just across the county line from its recent deep discovery at the 1 Gregory.

NORTH LOUISIANA SUCCESSFUL WILDCAT

Lincoln Parish, Unionville field discovery: Southwest Natural Producing Co. 1 Mrs. M. E. Colvin, NW NW SE 31-20n-2w, TD 9,003 ft., perf. Vaughn 8,738-56 ft., flowed 7,800,000 cu. ft. gas daily and 20 bbl. of 56°-gravity distillate per 1,000,000 cu. ft., ¼-in. choke, estimated open flow 20,000,000 cu. ft. of gas daily, flowing TP 3,900 psi.

NORTH LOUISIANA WILDCAT FAILURES

Bossier Parish: Sinclair Oil & Gas Co. 1 Vera Oden, SE NE 33-19n-13w, dry, TD 8,720 ft., elev. 182 ft., Massive anhydrite 4,322-4,566 ft., James 5,140 ft., Pine Island shale 5,302 ft., Sligo 5,474 ft., Travis Peak 5,787 ft., Cotton Valley shale 7,996 ft., porosity 8,330 ft., Bodcaw 8,486 ft., Davis 8,688 ft.

Caddo Parish: Bert Fields and The Texas Co. 1 Thigpen-Herold, SE NW 23-16n-16w, dry, TD 9,004 ft.

LaSalle Parish: Dan Montgomery 1 Nebo Oil Co., NW NW 2-8n-4e, dry, TD 4,543 ft., elev. 242 ft., Wilcox 2,782 ft., Nebo 3,713 ft.

Morehouse Parish: Barnsdall Oil Co. and C. H. Valerius 1 Crossett Lumber Co., approximately SW SE 3-23n-7e, dry, TD 5,447 ft., elev. 175 ft., Wilcox 1,590 ft., gas rock 2,298, 2,755 ft., Tokio 2,960 ft., Cotton Valley 3,080 ft., Smackover 5,158 ft.

ARKANSAS SUCCESSFUL WILDCAT

Union County: C. H. Murphy & Co. 1 Sue Olson, NE NE 32-18s-15w, Cotton Valley discovery, TD 7,825 ft., perf. 6,512-21 ft., flowed 151 bbl. of oil a day, 14/64-in. choke, TP 300 psi., GOR not reported; perf. 6,586-94 ft., flowed 178 bbl. of oil a day, 10/64-in. choke.

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Extension to Bishop Pool Logs Traverse Show

MOUNT PLEASANT.—Osceola Refining Co. logged 70 ft. of oil-cut mud on drill-stem test at its 1 Westra, SE NE SE 13-12n-14w, Sheridan Township, Newaygo County, an extension try located 1½ miles northwest of Bishop (Traverse) field, Newaygo County. The lime was logged at 2,238 ft., and hole was bottomed out at 2,239 ft. Packer was set at 2,223 ft. for a drill-stem test which was run for 2 hours. The failure of mudded 5-in. casing seat when swabbing was started was delaying further testing of this wildcat. Pipe had to be cemented at the Traverse lime contact point. The 1 Westra was reported to be about 13 ft. lower than Sun's 1 Wood, discovery well of Bishop pool.

Harris Oil Co., with a 10-bbl. producer at the 1 Horton, SW SE NE 27-1s-15w, Columbia Township wildcat, Van Buren County, had started another test at the 1 Huberty, NE NW SE 27-1s-15w, the diagonal southwest 10-acre offset to the Horton strike. The original discovery was plugged back in the Traverse from 1,131 ft., total depth, to 1,129 ft. before show was acidized. Top of the objective was picked at 1,126 ft.

The first Richfield zone test in Butman field to follow Superior Oil Co.'s discovery well in that horizon, Robert Bond's 1 Krivestky, NE SE NW 12-20n-1w, Gladwin County, appeared to be good for about 100 bbl. of oil a day on the basis of initial swab-flow tests after reacidization with 5,000 gal. This well, the diagonal northeast 40-acre offset to the discovery, swabbed and flowed 71 bbl. of oil and 14 bbl. of water in 8 hours on last day of tests before a pumping unit was moved to the well site. The following day, pressure had built up to 900 psi., and operator expected that the well might start to flow before pumping equipment had been set. The 1 Krivestky was bottomed out in the Richfield at 4,992 ft. with oil pays showing between 3,921-4,931 ft. On the basis of preliminary reports, it appeared likely that at least three other Richfield tests would be started around the present producers with 60 days.

MICHIGAN SUCCESSFUL WILDCATS

Allegan County, Casco Township: Dale M. Leonard 1 Haddaway, N½ NE NE 8-1n-16w, Traverse 1,156 ft., 2 bbl., TD 1,189 ft., PB 1,161 ft.

Muskegon County, Cedar Creek Township: Charles D. Hoffman 1 Buchannan, NW NW SE 19-11n-15w, Berea 1,117 ft., 750,000 cu. ft. of gas, TD 1,127 ft.

Van Buren County, Columbia Township: Harris Oil Co. 1 Horton, SW SE NE 27-1s-15w, Traverse 1,126 ft., 10 bbl., TD 1,131 ft., PB 1,129 ft.

MICHIGAN WILDCAT FAILURES

Allegan County, Valley Township: Cook Drilling Co. 1 Morris, NE NW SW 11-2n-14w, Traverse 1,511 ft., dry, TD 1,517 ft.

Arenac County, Lincoln Township: Muskegon Development Co. 1 Kozlowski, NW NE SE 33-18n-4e, Dundee 2,788 ft., dry, TD 3,055 ft.

Isabella County, Denver Township: Swan-King Oil Co. and Basin Oil Co. 1 Porter, SE NE NE 2-15n-3w, Antrim 2,567 ft., dry, TD 2,670 ft.

Nottawa Township: Nottawa Oil & Gas Co. 1 Schafer, SE SE NE 9-15n-5w, Dundee 3,859 ft., dry, TD 3,899 ft.

Livingston County, Green Oak Township: Panhandle Eastern Pipe Line Co. 1 Meyer Comm., SW NE NE 6-1n-6e, Niagara 3,841 ft., dry, TD 3,919 ft.

Osceola County, Lincoln Township: George F. Herr 1 Johnson, N¼ NE NE 17-18n-10w, Traverse 2,929 ft., dry, TD 2,947 ft.

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Canadian Fields

North Woodbend Test Finds Oil in Cretaceous

CALGARY.—The North Woodbend No. 1 test well, 1 mile north of the Leduc-Woodbend Devonian oil field, has discovered oil in a basal Cretaceous sand. The well is not yet down to the Devonian, but has had some "good looking" tests to date. In addition to the recent Cretaceous oil discovery made in drill-stem tests, the North Woodbend well had previously logged considerable natural gas in the Viking sand, and in sands in the lower Cretaceous above the oil horizon.

The well, located in LSD 2, 28-51-26w4, is on the southerly part of a 960-acre block of leases pooled by three Canadian independents and Imperial Oil, Ltd. The independents are: Anglo-Canadian Oil Co., Ltd., Home Oil Co., Ltd., and Calgary & Edmonton Corp., Ltd.

The latests two drill-stem tests, which showed the Cretaceous oil, were: 1-hour test of interval 4,266-72 ft.; maximum natural-gas flow 261,000 cu. ft. daily plus a 4,150-ft. pipe rise of crude oil; 1-hour test of interval 4,272-77 ft., maximum natural-gas flow rate 300,000 cu. ft. daily, with flow of crude oil reaching the surface in 55 minutes. Coring and testing is continuing.

A 2-mile southeast extension of the Joseph Lake Viking sand oil pool was confirmed when two drill-stem tests in the Viking horizon flowed oil at the Imperial-Superior-Joseph Lake No. 8-14 venture.

No. 8-14, in LSD 8, 14-20-22w4, ran test from 3,273-77 ft. and received a maximum natural-gas flow rate of 768,000 cu. ft. daily plus a flow of crude oil to the surface 7 minutes after valve was opened. Further test from 3,276-79 ft. gave a small unmeasured gas blow plus a flow of oil in 19 minutes.

The well is scheduled as a lower Cretaceous and Devonian test, so drilling, coring, and testing will continue in those formations.

Another well tagged to go in search of Devonian oil and gas possibilities is Redwater-Leaseholds-Campbell No. 5, indicated producer in the lower Cretaceous, about 12 miles north of Edmonton. Campbell No. 5, in LSD 6, 27-54-25w4, is currently making hole below 3,800 ft. The well, if placed on production from the Cretaceous, will be the fifth producer from that formation in the Campbell area.

Sixteen wells received their final answer in Alberta during the past week. Fourteen were placed on production while the remaining two were abandoned. Total completions since the beginning of this year has been raised to 289, including 214 oil producers, 7 gas wells, and 68 failures.

Alberta's prolific Redwater oil field again led the week's completion list with 10 wells placed on steady production the last 7 days. There were no failures at Redwater last week. Imperial Oil, Ltd., accounted for 8 of the new producers, boosting its total number of successful Redwater completions to 190. Bishop Oil Co. placed its third Redwater oil well on production, while the Mammoth-Capitol group completed its initial field oil well. The Mammoth-Capitol well is located on an east fringe farmout quarter section from the "Pacific Group."

Three wells were completed at Leduc-Woodbend last week, two oil wells and one stepout failure. The Home-Anglo-C.&E. team and Imperial each completed one oil well in the south Woodbend area; and Borealis Petroleums, Ltd., abandoned its 3-mile stepout west of Leduc production.

Canadian Gulf Oil Co. started its seventh Stettler oil well on steady flow, and Imperial successfully completed its fifth Excelsior oil well.

A wildcat failure was drilled by Genalta Holdings, Ltd., of Toronto. The test was

located in the Provost area about 180 miles northeast of Calgary and 9 miles west of the Alberta-Saskatchewan border.

UNSUCCESSFUL WILDCATS

Borealis 1, LSD 8, 21-50-27w4, TD 5,610 ft. Genalta-Provost 1, LSD 2, 21-39-2w4, TD 2,420 ft.

South Louisiana

Sinclair Bringing In Pointe Coupee Strike

NEW ORLEANS.—Eight miles north of Rosedale field and 3½ miles west of Erwinville townsite, Pointe Coupee Parish, Sinclair Oil & Gas Co. is completing its 1 H. M. Kimbell for a new field discovery. The wildcat came in through perforations at 9,205-10 ft., flowing 237 bbl. of oil daily through a 7/32-in. choke. The well was cleaning and making 12 per cent mud in the test, but it appeared that it would make a good producer and there would be no water in the flow. Tubing pressure was 1,320 psi. This discovery was drilled to a depth of 11,200 ft. Operators set 5½-in. casing to 9,294 ft. for completion.

The second producer in Manila Village field, Hunt Oil Co. 1 LL&E Co., 38-18s-24e, Jefferson Parish, is apparently producing from a new pay zone for the field. The well gaged 237 bbl. of 29.8°-gravity oil daily through a ⅛-in. choke from perforations at 12,787-95 ft. Total depth is 13,308 ft. Tubing pressure was 4,300 psi. Manila Village was discovered in March 1949 and the discovery well is producing from open hole at 12,944-13,050 ft. with 7,600 psi. pressure on the tubing. The third well for the same field is Tide Water Associated Oil Co. 1 John Watt, which has cored two oil sands and is advancing in search of possible new pay zones. Drilling and coring was continued below 13,271 ft., after 7-in. casing was set to 12,790 ft. Electrical log is due to be run at 13,300 ft.

A possible new, deeper pay zone is in prospect for the newly discovered Maxie area of Acadia Parish. Hassie Hunt Trust has set a string of 5-in. liner in 1 John Herman Schultz et al, which is bottomed at 11,712 ft. and will conduct production tests down to that depth. Previous gas-condensate production was developed at the 10,600-10,700-ft. interval. The well is located ½ mile southeast of the operator's 1 Robison, discovery well for the field, Section 6-9s-1e.

SOUTH LOUISIANA SUCCESSFUL WILDCAT

Plaquemines Parish: New oil discovery—Shell Oil Co. 1 State Lease 1,008, Block 24, offshore South Pass area, TD 12,128 ft., perf. pay 6,530-34 ft., 55 bbl. of 22.7°-gravity oil per day, 3/16-in. choke, TP 350 psi.

SOUTH LOUISIANA WILDCAT FAILURES

Iberia Parish: Magnolia Petroleum Co. C-1 State Lease 685, Eugene Island Block 95, offshore, dry, TD 12,095 ft.

Terrebonne Parish: Humble Oil & Refining Co. F-1 Continental Land & Fur Co., 12-17s-13e, 9 mi. SE Morgan City, dry, TD 11,575 ft.

Southwest Texas

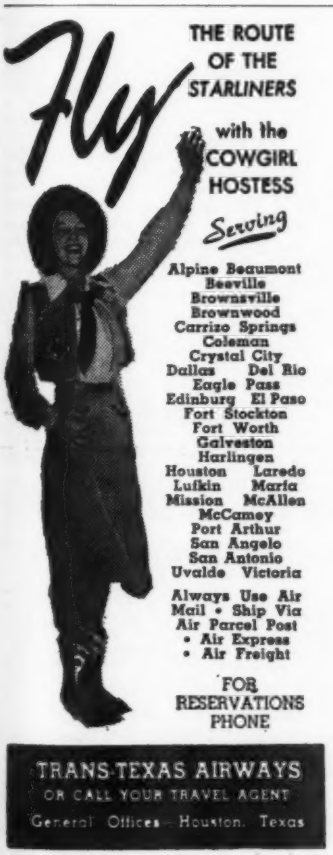
Brooks County Gas Field Gets New Shallower Pay

CORPUS CHRISTI.—New pay has been opened in Mariposa field of Brooks County at Frank W. Michaux and Sterling Oil & Refining Co. 1 D. J. Sullivan, Loma Blanca Grant. The well was drilled to a depth of 9,003 ft. and 5½-in. production casing set at 6,670 ft. Through perforations at 6,543-52 ft. the well was completed as a gas producer, although open flow gage has not been run. Tubing pressure was 1,950 psi. Location is approximately ¾ mile from Humble's C-5 Sullivan, which was completed as a gas well and shut in. Production in Humble's well was from 8,264-88 ft.

In Duval County, H. R. Smith, F. Wm. Carr, and W. E. Fox, trustees, have set casing and perforated for completion in the 1 Atlee Parr, after recovering oil on a drill-stem test. Through perforations at 5,000-08 ft., using ¼-in. choke, the wildcat had a good blow in 15 minutes and 500 ft. of oil and a little mud was recovered. Bottom-hole flowing pressure was 1,285 psi. and bottom-hole shut-in pressure was 1,945 psi. This new discovery is 1 mile northeast of Sweden field.

In the same county, Ralph E. Fair and Woodward & Co. have run several drill-stem tests in the 1 C. W. Hahl Co., wildcat 3 miles northwest of Freer, E. Rodriguez Survey 56, Abstract 1,881. A drill-stem test run at 7,555 ft. recovered 1,350 ft. of oil and 50 ft. of oil-cut mud with bottom-hole flowing pressure at 350 psi. Another test was run from 7,590-7,610 ft. using ⅜-in. and ¼-in. bottom chokes, and recovery was 25 ft. of condensate-cut mud and 10 ft. of condensate along with 49 ft. of muddy water. Bottom-hole flowing pressure was 1,600 psi. and shut-in pressure was 3,600 psi. Operators are at a total depth of 7,610 ft. and are setting pipe for completion attempt.

Shell Oil Co. has drilled to 6,430 ft. in the 1 Ben Korzekwa, wildcat 4 miles southwest of Falls City, Karnes County, and have set pipe and perforated for testing. On a drill-stem test run from 6,261-65 ft., it recovered 600 ft. of 35°-gravity oil and 15 ft. of mud. The prospective discovery is in the Louis Manchaca Survey.



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SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Bastrop County: George Cabbel 1-A W. W. Osborne, Samuel Wolfenbarger Sur., 1 mi. N Rockne, dry, TD 1,336 ft.

Duval County: John F. Camp & Sons, DeLange & Chumney 1 Range, J. Poitevent Sur. 528, 15 mi. W NW San Diego, dry, TD 4,112 ft.

Gorman-DeLange 1 Gray Ranch, E. R. Gray Sur. 560, A-1,102, 13 mi. NE Freer, dry, TD 3,280 ft.

Guadalupe County: W. D. Butler 1 Freeman & Seligmann, Gustavus Sur., 15 mi. NE Seguin, dry, TD 1,307 ft.

Milam County: Henry Barnes 1 Wesley Graham, Justo Liendo 4 League Grant, 3 mi. E of Thorndale, dry, TD 1,229 ft.

Nueces County: W. E. Fox, Trustee 1 R. N. O'Neal, Bishop & Blocker Subd., 5 mi. SW Corpus Christi, dry, TD 5,048 ft.

Webb County: Killam & Hurd, Inc. 1 Marrs McLean, Sur. 611, 6½ mi. SE Mirando City, dry, TD 2,532 ft.

Permian Basin

North-South Ends of Cogdell Joined by Canyon Producer

MIDLAND.—Called a link well between the north and south portions of Cogdell Canyon field (Kent and Scurry counties), D. D. Feldman 2 P. L. Fuller, located 467 ft. out of the southeast corner of 703-97-H&TC, has been completed for a flowing potential of 1,207 bbl. of 41.9°-gravity oil a day. Pay was topped at 6,745 ft. and drilled to 6,921 ft. Casing was set at 6,921 ft. and perforations made at 6,824-6,908 ft. The test was through ½-in. choke. Location of the new well is about midway between the Castleman & O'Neill area of Scurry County and Cogdell field of Kent County, but 1 mile west of a line drawn between the two fields.

In the new reef area 7½ miles northwest of Clairemont, Nelson Bunker Hunt 1 Mary Couts Burnett Trust, Section 3, D. R. Stout Survey, west of the discovery, completed flowing 645 bbl. of 39.5°-gravity oil a day through ⅜-in. choke. Gas-oil ratio was 747 cu. ft. and flowing pressures were 220 pis. on tubing and 200 psi. on casing.

South of the discovery, Caroline Hunt Trust 2 J. W. Young, 145-G-W&NW, completed for a flowing potential of 727 bbl. of 39°-gravity oil a day, through ⅜-in. choke on tubing set at 6,557 ft. Gas-oil ratio was 325 cu. ft. and pressures were 260 psi. on tubing and 600 psi. on casing.

Sun Oil Co. 1 D. G. Sampson, 9-98-H&TC, ½ mile south of Clairemont, and an east offset to the new field discovery of the same name, was drilling ahead below 6,698 ft. in sand after recovering bit cones. A core from 6,650-70 ft. recovered 20 ft. of shale, and a core from 6,670-98 ft. had 8 ft. of black shale and 15 ft. of tight sand, bleeding oil. A drill-stem test from 6,683-98 ft., open 1 hour, recovered 20 ft. of slightly oil-cut mud.

In Lynn County, Magnolia Petroleum Co. 1 Garza Land & Cattle Co., 431-9-ELRR Survey, 3½ miles southeast of Draw, completed as a Canyon reef discovery. Total depth was 8,630 ft., with pay topped at 8,615 ft. Potential was 244.6 bbl. of 42°-gravity oil a day through 24/64-in. choke. Gas-oil ratio was 765 cu. ft., and tubing pressure was 140 psi. The section had been treated with 250 gal. of mud acid.

Fuhrman Petroleum Co. 17 W. T. Ford, 16-A43-PSL., in Fuhrman-Mascho field of Andrews County, recompleted as a new pay discovery after drilling ahead from old total depth of 4,470 ft., to 5,612 ft. The Glorietta lime pay was topped at 5,592 ft., and about the middle of the section at 5,592-5,620 ft., yielded some 1,200 ft. of free oil on drill-stem test. Potential was 250 bbl. of 29°-gravity oil a day, flowing by gas lift through open tubing. Gas-oil ratio was 100 cu. ft.

In West Fort Chadbourne field, Coke County, Barnsdall Oil Co. 3 Harris Davenport, League 475, Seth Clark Survey, completed dry at 5,755 ft. On elevation of 1,993 ft., it had top of the Odom (Strawn) lime at 5,534 ft. and the Ellenburger at 5,720 ft. A drill-stem test from 5,534-47 ft. recovered gas-cut mud and some salt water. A test at 5,710-55 ft., open 3 hours, recovered 2,400 ft. of gas in the drill pipe, 50 ft. of drilling mud, 240 ft. of heavily oil and gas-cut mud, plus 360 ft. of oil and gas-cut salt water.

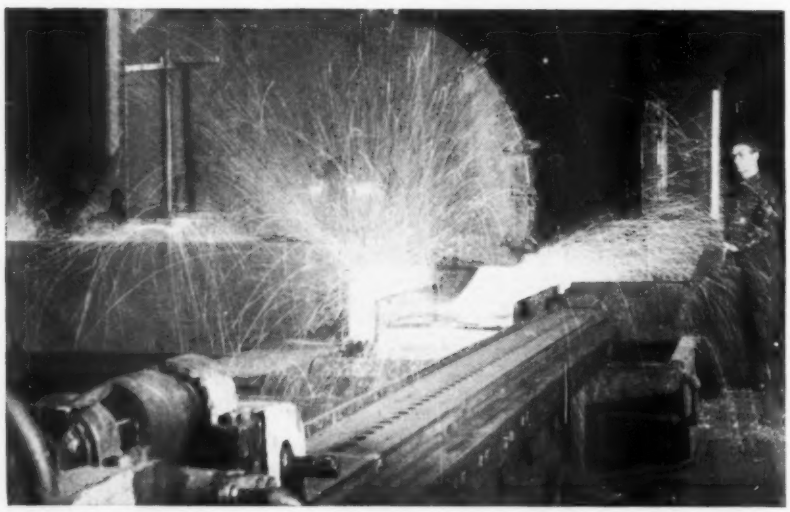
Ted Weiner and others 1-A J. O. Jones, SW NW 2-H-D&W, extended the Cedar Lake field of Gaines County 2 miles to the north, with a flowing potential of 157 bbl. of 34°-gravity oil a day. Pipe was set on top of pay at 4,750 ft. The section to total depth of 4,848 ft. was treated with 8,000 gal. of acid.

Esperado Mining Co. 1 T. J. McDonnell, 335-97-H&TC, 1½ mile west extension to Kelley-Synder field, completed flowing 627 bbl. of oil a day through ¼-in. choke, from pay topped at 6,775 ft. and drilled to 6,936 ft. Top of the reef was 6,748 ft. Magnolia Petroleum Co. has staked the 1-D McDonnel in SW SE 336-97-H&TC, an east offset, and its 1-C McDonnell, located in the NE NW Section 297.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCATS

Kent County: Spartan Drilling Co., Lone Star Producing Co. and Signal Oil & Gas Co. 1 J. W. Young, NW NW 98-G-W&NW, 11 mi. W Clairemont, TD 7,895 ft., elev. 2,363 ft., tentative Strawn top 7,025 ft., pay 7,348 ft., pumped 51.2 bbl. of 38°-gravity oil a day, perf. 7,353-59 ft., GOR 200 cu. ft., PB 7,359 ft.

Winkler County: Phillips Petroleum Co. 1 R. F. Waddell, SW SE 5-B7-PSL, 1 mi. NW Wheeler field, TD 10,775 ft., elev. 3,107 ft., Ellenburger 10,732 ft., pay 10,730 ft., 5-in. casing 10,735 ft., flowed 1,361 bbl. of 43°-gravity oil a day, ½-in. choke, GOR 834 cu. ft., TP 475 psi.



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WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Crockett County: Cities Service Oil Co. 1 W. R. Baggett, 42-OP-GC&SF, 4 mi. N Ozona, dry, TD 1,550 ft., elev. 2,535 ft., San Andres 1,290 ft.,

Moore Exploration Co. 2-K Shannon est., SW SW League 4, Archer CSL, 4 mi. NW Ciara Couch field, dry, TD 7,056 ft., elev. 2,527 ft., Yates 1,190 ft., Grayburg 2,050 ft., Clear Fork 3,330 ft., Ellenburger 6,858 ft.

Garza County: V. A. Brill 1-A J. J. Koonsman, 678-97-H&TC, 8 mi. SW Justiceburg, dry, TD 4,224 ft., anhydrite 815 ft., Yates 1,285 ft., San Andres 2,430 ft.

Kent County: Coronado Oil Co. 1 Fleming Foundation, NE NE 53-K-T. A. Thompson Sur., 10 mi. E Cogdell field, dry, TD 7,260 ft., elev. 2,032 ft., Mississippian 6,970 ft., Ellenburger 7,200 ft.

Pecos County: Hunt Oil Co. 20 Elsinore Royalty Co., 12-B-GC&SF, 4½ mi. SE Chancellor, dry, TD 1,865 ft., completed as water well.

Presidio County: Wesley W. West and H. C. Cockburn 1 Presidio Trust, 23-1-Denison & Pacific RR Sur., 9½ mi. NE Presidio, dry, TD 8,774 ft., elev. 3,469 ft., Ellenburger 8,554 ft.

Scurry County: L. Lockhart 1 F. H. Patterson, approximately SE SW 121-3-H&GN, ¼ mi. NW Gene Goff 1 Rylander, dry, TD 7,810 ft., elev. 2,395 ft., Strawn 7,156 ft., Ellenburger 7,781 ft.

Tom Green County: Theo Montgomery 1 J. R. Mims, 82-6-H&TC, 18 mi. SW Water Valley, dry, TD 1,295 ft., elev. 2,373 ft.

SOUTHEAST NEW MEXICO SUCCESSFUL WILDCAT

Lea County: Union Oil Co. 1 C. H. Kyte, 1,980 ft. from S and 330 ft. from W lines, 5-20s-39e, 1 mi. E House field, San Andres discovery, TD 7,738 ft., PB 4,410 ft., elev. 3,587 ft., pay 4,357 ft., pumped 153 bbl. of 31°-gravity oil a day, GOR 285 cu. ft.

Illinois-Ind.-Ky.

New Oil Pools Indicated In Two Illinois Counties

SOHIO PETROLEUM CO. 1 Williams, SE SE SW 34-3s-9e, a wildcat located about 2 miles northwest of Centerville, White County, Illinois, flowed clean oil in a drill-stem test of Aux Vases sand at 3,322-36 ft., and has run casing to the top for completion. In the test, with tool open 1¾ hours, gas showed in 11 minutes. In the breakdown, 60 ft. of oil and gas-cut mud was recovered. The location is in the area between the Goldengate Consolidated and Centerville pools, being about a mile southeast of the former and about the same distance northwest of the latter.

Another wildcat, A. J. Slagter, Jr., 1 Kunust, SW NE SW 20-1n-10e, 1½ miles south of Bennington, Edwards County, Illinois, also is showing for a possible new pool-opener. A mile southeast of production of the Bennington pool, it found good saturation in O'Hara lime at 3,233-39 ft. and has run casing to 3,230 ft. for completion. A drill-stem test had gas to the surface within 5 minutes and flowed clean oil in 45 minutes.

Aurora Gasoline Co. 1 Wells, Mil Don 165-2n-9w, is a prospective pool-opener in Knox County, Indiana. More than 6 miles from any other production, it swabbed 3½ bbl. of oil per hour from the Aux Vases section with saturation at 1,536-49 ft. Pay zone previously was acidized with 1,000 gal., but will be reacidized in an attempt to improve production.

First commercial production in the area 8 miles south of Elkton, Todd County, in the extreme southern part of western Kentucky, is in prospect at W. H. Ware and associates 2 Kennedy, 5-C-29. In Devonian lime at 1,206-14 ft., the well is reported pumping up to 75 bbl. of 38°-gravity oil per day. Testing continues.

ILLINOIS SUCCESSFUL WILDCATS

Gallatin County: C. E. Skiles 1 Holland, SW SW NE 28-7s-9e, IP 268,000 cu. ft. gas, Tar Springs 2,314-25 ft., TD 3,090 ft.

Hamilton County: Oil Management, Inc., 1 Howard, SE SE NE 4-7s-6e, IP 14 bbl., Aux Vases 3,185-95 ft., TD 3,197 ft. (Extension Walpole pool.)

Madison County: B. Roan 1 Blom, NW NW SW 27-6n-6w, IP 2 bbl., Pennsylvanian sand 565-71 ft., TD 581 ft.

Joe Kesl, Jr., 1 Engelke, NW SW NW 29-6n-6w, IP 10 bbl., Pennsylvanian sand 527-40 ft., TD 545 ft.

ILLINOIS WILDCAT FAILURES

Bond County: T. Myers 1 Gaffner, NE SE SW 31-5n-2w, dry, TD 2,453 ft.

Clark County: F. Ellison 1 Murphy, SE SE NE 32-9n-14w, dry, TD 652 ft.

F. Strickland 1 Staub, SW SE SW 30-12n-12w, dry, TD 2,345 ft.

Clay County: W. L. Griffith 1 Bryant, SE SW NW 34-5n-6e, dry, TD 2,950 ft.

Coles County: D. N. Claypool 1 Walker, SW NE SW 14-11n-10e, dry, TD 772 ft.

Crawford County: Henson Drilling Co. 1 Reingold, SE SW NE 19-6n-10w, dry, TD 1,500 ft.

Edgar County: Mid Globe Oil Co. 1 Stanfield-Burgett, SW SE SE 27-13n-11w, dry, TD 1,042 ft.

George Zicos 1 Honnold, NE SE NE 10-13-14w, dry, TD 452 ft.

Gallatin County: C. Angle 1 Peoples, NE SE SE 9-9s-9e, dry, TD 1,880 ft.

Robinson & Puckett 1 Mitchell, SW SE SE 28-8s-9e, dry, TD 2,913 ft.

Jefferson County: T. B. Dirickson 1 Stonecipher, SE SW SE 25-1s-3e, dry, TD 2,972 ft.

Lawrence County: J. F. Balderson 1 Wier, SW SW NE 29-2n-13w, dry, TD 2,818 ft.

J. L. Black 1 Jenners, NE NE SE 35-4n-13w, dry, TD 2,552 ft.

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mann, SE SW SE 20-6n-6w, dry, TD 572 ft.
George Cossens 1 fee, SW SW NE 23-5n-7w, dry, TD 1,661 ft.
Sangamon County: Blakely & Gruff 1 Cooper, SW NW NW 14-15n-3w, dry, TD 2,402 ft.
Wayne County: Nation Oil Co. 1 Nation, NE NE NE 30-2s-8e, dry, TD 3,475 ft.

INDIANA WILDCAT FAILURES

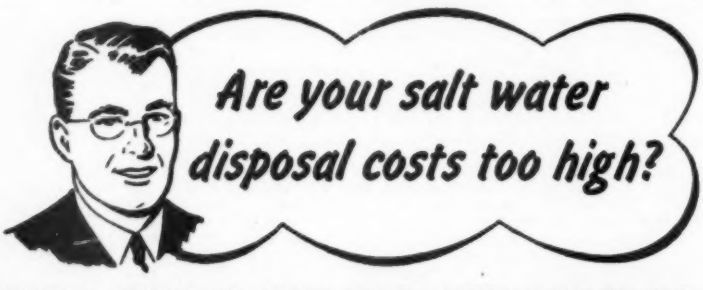
Daviess County: J. Hedds 1 Perkins, SE SE NW 9-3n-6w, dry, TD 1,212 ft.
J. Hedds 1 Simonas, NE SW SE 18-3n-6w, dry, TD 1,355 ft.
James Sutliff 1 Wells, NE SE SE 7-4n-6w, dry, TD 1,235 ft.
Ivan White 1 Sims, SE NE SE 30-5n-5w, dry, TD 965 ft.
Dubois County: B.L.S. Drilling Co. 1 Scherle, SE NW NW 4-2s-5w, dry, TD 670 ft.
George C. Engle 1 Alko, NW NW NE 33-1s-12w, dry, TD 2,450 ft.
Gibson County: J. C. Haynes et al., 1 Noble, NW SW NW 25-2s-9w, dry, TD 1,783 ft.
Posey County: C. E. Skiles 1 Thacker heirs, NE NE NW 13-5s-12w, dry, TD 2,754 ft.
Randolph County: Porter Gorton 1 Starbuck, SW SW SE SW 4-19n-13e, dry, TD 1,098 ft.
Vigo County: Banks-Coleman 1 Caffee, NW NE SE 25-11n-9w, dry, TD 1,916 ft.
Warrick County: V-T Drilling Co. and Texas-Indiana Oil Co. 1 McNeely, SW NW NE 4-6s-9w, dry, TD 2,135 ft.

WESTERN KENTUCKY WILDCAT FAILURES

Ohio County: Great Lakes Carbon Co. 1 Hawkins, SE NE NW NW 20-O-32, dry, TD 1,092 ft.

EASTERN KENTUCKY

ASHLAND.—In Big Sandy gas field recent drilling by the Kentucky-West Virginia Gas Co. has resulted in the following completions: 5896 Harvey G. Johnson, Left Beaver Creek in Floyd County, 119,000 cu. ft. of gas daily from Devonian black shale at 2,980-3,590 ft., total depth; 944 Ella F. Bentley, Greasy Creek in Pike County, 231,000 cu. ft. of gas daily from Devonian shale at 3,503-4,217 ft., total depth, shot with 6,600 lb. of gelatin; 5887 P. W. Day, Caney Creek, Pike County, 1,356,000 cu. ft. of gas daily from the Big lime (Mississippian) at 2,418-2,778 ft., total depth.



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Rocky Mountain

Trigood Finds Oil in Second Muddy Sand Well

DENVER.—Trigood Oil Co. of Casper is preparing to complete the second Muddy sand well in Glenrock field, Converse County, Wyoming. The well is 1 C & NW Railroad, SE NE NW 5-33n-75w, 1 mile southwest of Steelco Drilling Co. Muddy sand discovery well in the field.

On drill-stem test between 7,053-7,104 ft. the well made 3,300 ft. of 40°-gravity oil and 500 ft. of gas and oil-cut mud in 10 minutes. Top of Muddy was found at 7,035 ft. and saturation was cored from 7,077 to 7,104 ft., with the well at 7,120 ft. total depth.

Wells drilled by Steelco and Phillips Petroleum Co. east and south of the Muddy sand discovery well have failed to find oil in that sand, and Phillips has completed two Dakota sand wells since the Steelco discovery. Trigood recently abandoned an extension ½ mile west of the present well after failing to find oil in the Muddy or Dakota sands.

Casing has been cemented at 5,760 ft. at the Platte River Oil Co. wildcat at 1 Fuerst, NE NE NW 1-3n-59w, 6 miles west of the town of Fort Morgan, Morgan County, Colorado, after the well made oil on drill-stem test in the lower Benton shale zone. The well is at 5,795 ft., total depth, and on test between 5,700-5,758 ft. the well made 200 ft. of oil cut mud in 30 minutes. A second test from 5,720-5,758 ft., open 1½ hours, showed 175 ft. of clean oil and 145 ft. of oil and gas-cut mud. The wildcat is still reported above the Muddy sand, principal objective of the well, and other wells in this general area of the Denver-Julesburg Basin have logged shows of oil in the Benton section.

Tests are not too encouraging for the Gusher, Utah, wildcat being completed by The California Co. The well is 1 Unit, SE NW NW 35-5s-19e, 5 miles southeast of the Carter Oil Co.-Stanolind Oil & Gas Co. Roosevelt discovery well. The operator has reacidized with 5,000 gal. in the fractured zone in Basal Green River formation between 8,699-8,950 ft. and swabbed 18 bbl. of 31°-gravity oil in 3 hours with fluid level at around 7,000 ft.

WYOMING WILDCAT FAILURE

McCullough Peak area, Park County: Hamm Brewing Co.-Trigood Oil Co. 1 Unit, SE NW SW 21-54n-100w; 12,299 TD; Lance 6,365, Judith Basin 8,063, Claggett 8,865, Virgelle 9,643, Elk Basin sand 9,920, Cody 10,010, Frontier 11,742, first Frontier sand 11,870, Nowry 12,223; abd.

COLORADO WLLDCAT FAILURES

Horse Fly area, Montrose County: Pure Oil Co. 1 Unit, C NE SW 14-46n-13w; 5,035 TD; PB 1,970; Entrada 947, Kayenta 1,033, Wingate 1,045; abd.
Fort Morgan area, Morgan County: T. L. Boye 1 Whittenton, NE N NE 24-5n-58w; 1,972 TD; abd.
Orchard area: G. D. Groves et al 2 Orchard-State, SW NE SE 16-4n-60w; 1,250 TD; suspended indefinitely.
North Proctor area, Logan County: Plains Exploration 1 Stratton, SE SE SE 18-11n-50w; 4,932 TD; Niobrara 3,614, Fort Haynes 3,897, Codell 3,970, Carlisle 3,978, Greenhorn 4,170, Graneros 4,225, first Dakota Group 4,410-50, second Dakota

Group 4,465-4,505, third Dakota Group 4,550-4,602, Fuson 4,602, Lakota 4,720, Morrison 4,853; abd.

Appalachian Field

Pennsylvania Deep Test Counted as Failure

PITTSBURGH.—In Wharton Township, Fayette County, Pennsylvania, William E. Snee et al 3 Indian Creek Coal & Coke Co., deep wildcat, elevation 2,615 ft., is being plugged after unfavorable results from shooting and acidizing in the chert. The following tops were reported: Onondaga 6,994 ft., chert 7,012 ft. with a show of gas at 7,193-94 ft., Oriskany sand 7,306 ft. Total depth was 7,588 ft. In Napier Township, Bedford County, South Penn et al, Snee & Eberly 1 Jesse B. Miller, elevation 1,686 ft., after reaching a depth of 7,255 ft. and encountering a fishing job, is drilling an 8-in. hole past the tools.

An Oriskany test in the Limestone Hill area, West Virginia, resulted in salt water. In Grant district, Jackson County, Davis-Kelly Gas Co. 1 E. E. Conger et al, elevation 864 ft., had water at 5,165-69 ft., total depth. The well logged Corniferous lime at 5,038 ft., Oriskany sand at 5,164 ft., show of gas and oil at 5,165-66 ft. In this same section, but in Steele district, Wood County: Columbian Carbon Co. 1143 Godfrey L. Cabot, Inc. (Ruble Tract), elevation 908 ft., topped the Corniferous lime at 5,046 ft. and is drilling below 5,112 ft. Same company's 1145 Godfrey L. Cabot, Inc. (Dye Tract), elevation 823 ft., topped the Corniferous lime at 4,930 ft., and continues past 4,973 ft.; United Carbon Co. 1682 M. E. Stuckey, elevation 960 ft., topped the Corniferous lime at 5,150 ft. and was running 7-in. casing at 5,162 ft.

In Tucker district, Wirt County, Glen W. Roberts 1 Forrest Daugherty, elevation 1,066 ft., reached the Corniferous lime at 5,260 ft. and 7-in. casing is being run at 5,284 ft. In Dry Fork district, Tucker County, Cumberland & Allegheny Gas Co. 1-A-425 Jason Harman, elevation 3,304 ft., recorded the chert at 8,333 ft. and is drilling at 8,365 ft.

PENNSYLVANIA WILDCAT FAILURE

Fayette County, Wharton Township: William E. Snee et al 3 Indian Creek Coal & Coke County, elev. 2,615 ft., dry, Onondaga 6,994 ft., chert 7,012 ft., show of gas 7,193-94 ft., Oriskany sand 7,306 ft., TD 7,588 ft.

WEST VIRGINIA WILDCAT FAILURE

Jackson County, Grant district: Davis-Kelly Gas Co. 1 E. E. Conger et al, elev. 864 ft., dry, Corniferous lime 5,038 ft., Oriskany sand 5,164 ft., show of gas and oil 5,165-66 ft., water 5,165-69 ft., TD 5,169 ft.

Eastern Texas

Bolivar District Gets Rank Test

DALLAS.—A long stepout from the Bolivar area of Denton County has been scheduled by Baker Price Drilling Co. and E. R. Causey, of Tyler. The operation is to be the 1 L. F. Doherty, 660 ft. from west and 330 ft. from south lines of the lease, or 1,498 ft. from north and 1,727 ft. from east lines of the N. Wade Survey, A-1407. Drill site of the proposed 3,500-ft. wildcat is 3 miles northwest of the town of Denton and 9 miles south of South Bolivar field.

J. M. Hickey & Sons made location for 1 E. R. Bentley, a semiwildcat 2 miles north of Bolivar and about ½ mile north of the South Bolivar area. The 1,800-ft. test is 1,900 ft. from south and 450 ft. from west lines of the J. A. Burn Survey.

R. Holbert 1 Dallas Curtsinger, another semiwildcat in the J. B. Reed Survey, A-1,086, ½ mile south of Bolivar and ¾ mile south of nearest production, was dry at 2,076 ft.

Great Expectations Oil Corp. decided to test higher in the Woodbine at their 1 J. P. Key, Limestone County wildcat 4 miles west of Mexia, which last week was reported dry at 2,984 ft. A drill-stem test from 2,804-07 ft. recovered salt water with a light show of oil. Top on the Woodbine was 2,711 ft., with 5½-in. casing set to 2,746 ft. Operators plugged back to 2,738 ft. and perforated casing with 72 shots at 2,726-40 ft. After cleaning itself, the 1 Key made an open flow gage of 15,000,000 cu. ft. of gas a day, under bottom-hole flowing pressure of 1,464 psi. Flowing through 12/64-in. choke, it gaged 3,500,000 cu. ft. of gas a day.

EAST TEXAS (DISTRICTS 5, 6 AND 6-P) WILDCAT FAILURES

Grayson County: Kingery Bros. 1 E. B. Moore, Elizabeth Barnes Sur., A-55, 7 mi. NW Whitesboro, dry, TD 4,010 ft.

Hopkins County: Marine Oil Co. 1 Holloway, Wm. H. Moses Sur., A-592, 4 mi. S Sulphur Springs, dry, TD 8,515 ft., elev. 563 ft., Pecan Gap 2,345-2,465 ft., Gober 3,035 ft., Austin 3,845-3,945 ft., sub-Clarksville 3,975 ft., Woodbine 4,545 ft., Comanche 5,257 ft., Duck Creek 6,082 ft., Goodland 6,245 ft., Paluxy 6,315 ft., upper Glenrose 6,685 ft., Massive anhydrite 7,610-20 ft.

Upshur County: Morris Coats & John Robbins 1 Mrs. G. M. Fisk, J. M. Brown Sur., 2½ mi. SE Bettie, dry, TD 5,737 ft., elev. 330 ft.

Wood County: Coats & Hearrell Drilling Co. 1 Ruby Turlington, Wm. Fisher Sur., 7 mi. NW Hawkins, dry, TD 5,670 ft.

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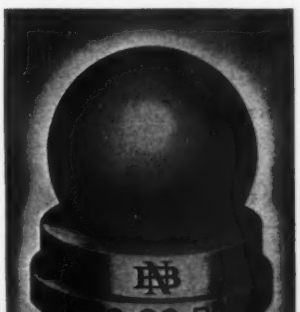
When you buy No-Co-Ro, you buy more than just a high-quality material... you buy a product that for years has symbolized to successful producers everywhere the top in craftsmanship and performance.

Three generations in business, past prestige, soundness, quality of products... all these have always counted in estimating the worth of Norris Brothers' products. They still apply and will continue to apply with equal force in the judging of oil well supplies.



Norris Brothers, INC.
ROBINSON · ILLINOIS

XUM

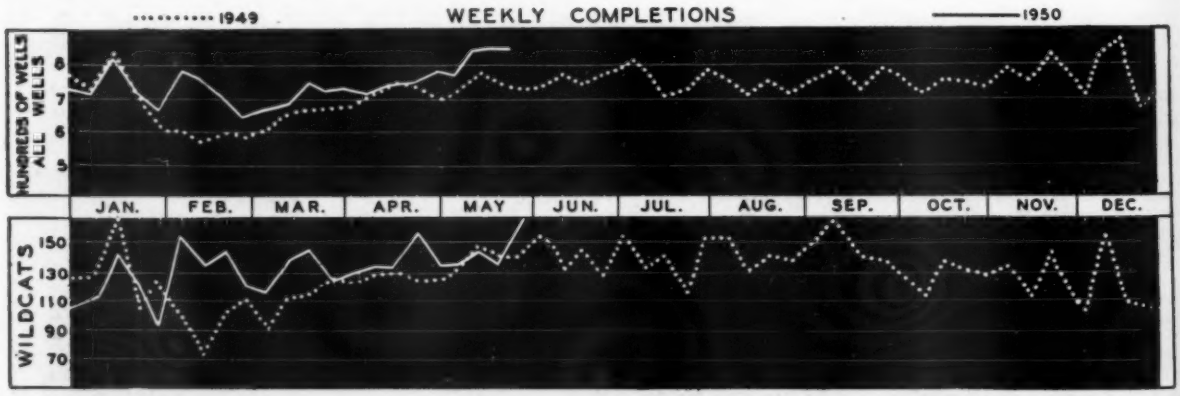
CURRENT STATISTICS

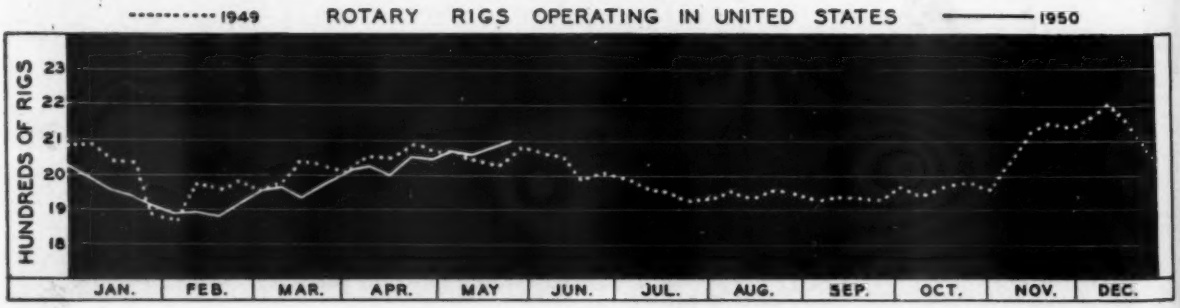
EXPLORATION

WEEKLY WELL COMPLETIONS . . . . WEEK ENDED MAY 27, 1950

	Total of all wells					May 27		Wildcat completions and discoveries					Cumulative total, 1950				
	Comp.	Oil	Gas	Dry	Footage	1950	1949	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	6	3	0	*3	7,245	181	525	0	0	0	0	0	0	0	0	0	0
Pennsylvania	17	5	6	†6	39,925	406	829	0	0	0	1	1	0	0	0	2	2
West Virginia	15	1	10	4	34,546	252	202	0	0	0	1	1	0	0	7	10	17
Ohio	19	10	6	3	45,804	362	457	0	0	0	0	0	1	0	1	6	8
Indiana	43	12	1	30	73,198	499	485	0	0	0	11	11	13	0	1	93	107
Kentucky	19	11	3	5	34,623	342	352	0	0	0	1	1	6	0	1	26	33
Illinois	67	29	1	37	144,056	923	895	3	0	1	17	21	17	0	1	214	232
Michigan	24	11	1	‡12	52,658	301	351	2	0	1	6	9	15	0	4	102	121
Kansas	75	37	9	*29	239,053	1,426	1,210	2	0	0	15	17	33	0	2	220	255
Nebraska	3	1	0	2	10,657	33	13	0	0	0	1	1	0	0	1	14	15
Oklahoma	88	53	5	§30	327,490	2,062	1,650	0	0	0	15	15	58	5	8	262	333
Texas	284	179	15	90	1,204,443	6,164	5,355	10	0	1	48	59	195	13	45	963	1,216
North Central (Dist. 7-B & 9)	99	56	1	42	279,176	1,927	1,729	7	0	0	25	32	78	2	11	358	449
West (Dist. 7-C & 8)	73	59	1	13	404,749	1,793	1,197	2	0	0	8	10	45	1	1	199	246
Panhandle (Dist. 10)	11	6	5	0	32,670	387	425	0	0	0	0	0	1	0	2	8	11
Eastern (Dist. 5, 6, & 6-P)	12	5	0	7	48,234	427	386	0	0	0	4	4	7	1	1	87	96
Gulf Coast (Dist. 2 & 3)	44	25	5	14	244,035	846	774	1	0	1	4	6	33	5	17	128	183
Southwest (Dist. 1 & 4)	45	28	3	14	195,579	784	844	0	0	0	7	7	31	4	13	183	231
Louisiana	59	30	7	22	365,870	949	795	1	1	0	6	8	25	8	4	77	114
Northern	30	13	5	12	127,620	489	402	0	1	0	4	5	4	1	1	32	38
Southern	29	17	2	10	238,250	460	393	1	0	0	2	3	21	7	3	45	76
Arkansas	9	6	0	3	31,832	147	117	1	0	0	0	1	3	0	0	34	37
Mississippi	4	1	0	3	34,763	131	149	0	0	0	2	2	7	2	0	47	56
Southeastern States	0	0	0	0	0	26	20	0	0	0	0	0	0	0	1	17	18
Montana	2	0	0	2	4,244	67	81	0	0	0	0	0	1	0	0	9	10
Wyoming	9	7	0	2	53,211	216	228	0	0	0	1	1	7	0	0	24	31
Colorado-Utah	5	0	0	5	19,347	26	46	0	0	0	4	4	0	0	0	21	21
New Mexico	8	6	0	2	29,482	254	227	1	0	0	0	1	9	0	0	22	31
California	38	30	0	8	176,419	677	1,062	0	0	0	8	8	10	0	2	137	149
Miscellaneous	0	0	0	0	0	6	13	0	0	0	0	0	0	0	0	6	6
Total United States	794	432	64	298	2,928,866	15,450	15,062	20	1	3	137	161	400	28	78	2,306	2,812
Total previous week	845	486	68	291	3,193,996	....	....	26	1	2	106	135	380	27	75	2,169	2,651
Total May 27, 1949	772	421	54	297	2,654,117	....	....	21	2	5	113	141	355	35	70	2,126	2,586

Service wells included: *3, †4, ‡2, §1.





DAILY AVERAGE PRODUCTION FOR WEEK

	May 27 crude oil	B. of M. May demand	May 20 crude oil
Alabama	1,750	1,900	1,750
Arkansas	78,750	86,000	78,800
California	856,450	845,000	858,500
Colorado	60,900	63,000	56,900
Eastern	61,600	60,800	61,700
Florida	800	1,100	675
Illinois	175,100	182,000	172,800
Indiana	30,300	27,000	29,200
Kansas	282,300	280,000	279,800
Kentucky	26,200	25,000	26,400
Louisiana	521,650	550,000	522,400
North Louisiana	120,450	.....	121,200
South Louisiana	401,200	.....	401,200
Michigan	48,300	45,000	47,600
Mississippi	101,550	102,000	103,400
Montana	23,600	25,000	23,800
Nebraska	1,450	2,200	1,500
New Mexico	126,125	139,000	126,125
Oklahoma	415,650	425,000	413,700
Texas	2,085,100	2,090,000	2,085,100
Dist. 1 (Southwest)	27,400	.....	27,400
Dist. 2 (Southwest)	121,850	.....	121,850
Dist. 4 (Southwest)	194,500	.....	194,500
Dist. 3 (Gulf Coast)	376,525	.....	376,525
Dist. 5 (Eastern)	31,525	.....	31,525
Dist. 6 (Eastern)	82,575	.....	82,575
East Texas field	262,000	.....	262,000
Dist. 7-C (West)	51,000	.....	51,000
Dist. 8 (West)	640,250	.....	640,250
Dist. 7-B (W. Central)	67,000	.....	67,000
Dist. 9 (N. Central)	139,000	.....	139,000
Dist. 10 (Panhandle)	91,475	.....	91,475
Utah	3,300	3,000	3,400
Wyoming	161,500	147,000	159,900
Total United States	*5,062,375	5,100,000	5,053,450
Change from previous week, up	8,925		
Canada	60,850	.....	60,785

Total U. S. production January 1-May 27 ..... †734,159,755 bbl.
Same period last year (crude plus cond.) ..... 769,562,875 bbl.

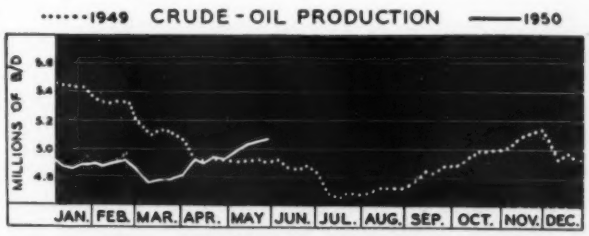
*Not incl. 105,930 bbl. condensate. †Incl. 14,148,853 bbl. condensate.

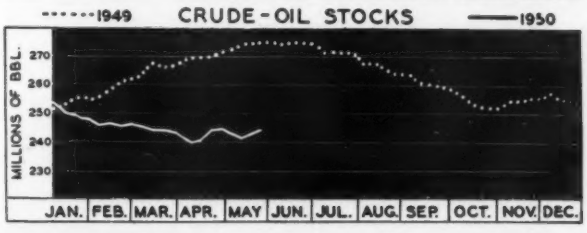
CRUDE-OIL STOCK BY STATES OF ORIGIN*

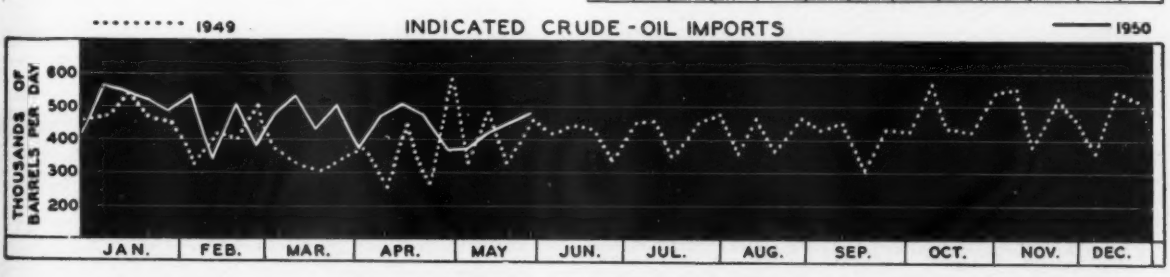
(Thousands of barrels)

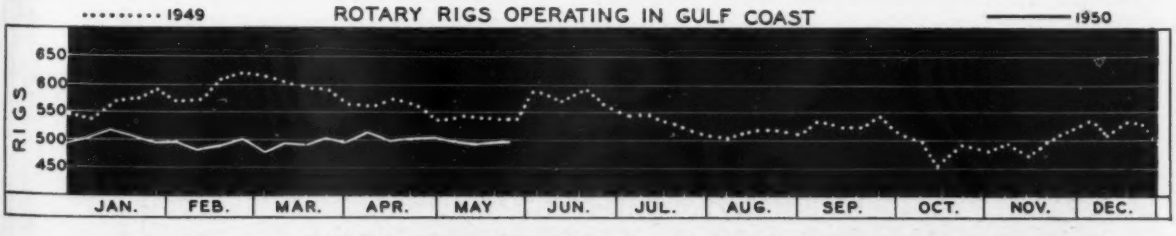
	May 20, 1950	May 13, 1950	May 21, 1949
Pennsylvania Grade	2,901	2,866	3,133
Other Appalachian	1,807	1,797	2,134
Illinois, Indiana, Michigan	9,019	8,857	14,458
Arkansas	2,923	2,908	3,052
Louisiana	15,193	15,151	14,346
North	3,522	3,346	3,155
Gulf	11,671	11,805	11,191
Mississippi	2,466	2,375	3,321
New Mexico	5,974	5,883	7,319
Oklahoma and Kansas	35,729	36,287	39,597
Texas	110,490	109,704	129,686
East Texas	14,995	14,797	17,890
West Texas	40,322	39,831	51,752
Texas Gulf	27,827	27,310	31,369
Other Texas	27,346	27,676	28,675
Rocky Mountain	13,344	13,239	13,592
California	36,886	36,520	35,153
Foreign	6,292	6,203	8,251
Total	243,024	241,770	274,042

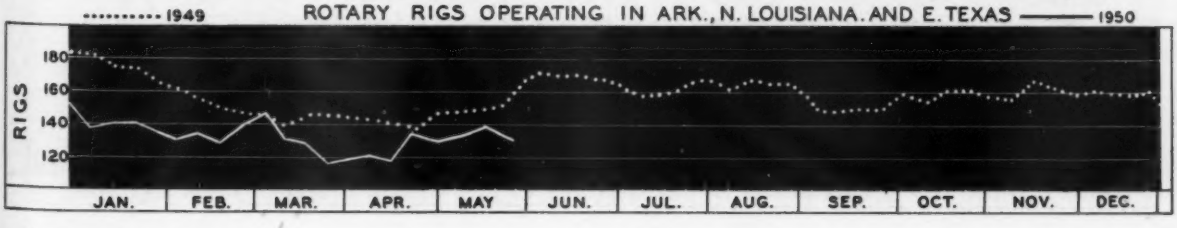
*Bureau of Mines.










1949 ROTARY RIGS OPERATING IN ARK., N. LOUISIANA AND E. TEXAS 1950
RIGS
180
160
140
120
JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV. DEC.

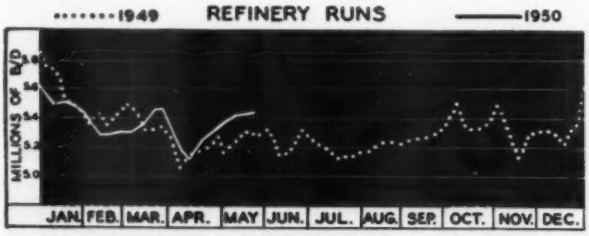
XUM

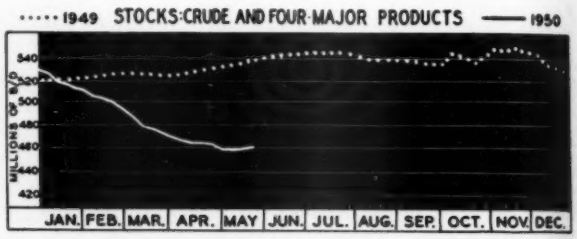
A.P.I. REFINERY REPORT, MAY 20

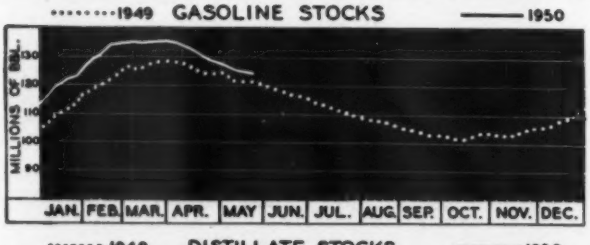
(Thousands of barrels)

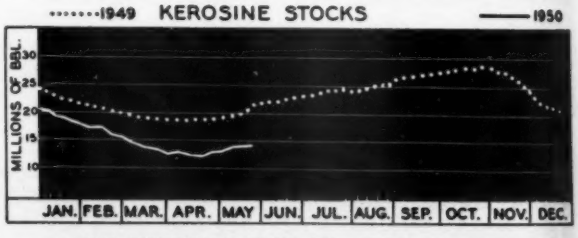
District—	Daily avg. crude runs	Daily average production				Stocks at refineries, bulk terminals, in transit and in pipe lines				Bureau of Mines, May 1949				
		Gasoline*	Kerosine	Distillate	Residual	Gasoline†	Kerosine	Distillate	Residual	Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual
East Coast	981	387.3	38.7	177.0	219.3	26,713	5,051	9,745	9,370	751	317.7	21.3	145.7	172.6
Appalachian:														
District 1	97	39.9	4.3	14.3	10.1	2,469	304	475	291	90	40.2	3.5	8.6	10.5
District 2	73	35.3	5.3	9.3	15.6	978	89	133	145	58	31.6	2.1	4.1	10.7
Ind., Ill., Ky.	995	528.4	61.0	155.1	149.4	25,421	2,494	5,064	2,437	910	493.8	48.4	111.8	143.1
Okla., Kans., Mo.	491	273.7	16.1	101.8	58.4	13,639	791	3,077	936	413	226.0	22.1	78.6	60.8
Inland Texas	207	147.4	12.9	26.7	40.9	3,588	260	772	687	222	155.1	12.0	19.2	47.0
Texas Gulf Coast	1,125	543.4	93.1	248.6	217.4	19,045	2,134	5,951	3,747	1,203	630.7	68.0	183.9	213.4
La. Gulf Coast	469	243.3	56.0	105.1	51.2	6,077	2,096	2,566	1,904	407	208.6	34.8	93.4	43.7
N. La. and Ark.	70	23.6	8.0	12.7	13.4	2,815	271	485	192	81	31.0	6.0	14.4	18.3
Rocky Mountain:														
New Mexico	13	7.1	0.4	1.9	2.7	120	25	52	31	13	6.9	0.4	1.7	3.3
Other Rocky Mtn.	154	80.9	4.3	31.6	29.7	5,093	298	1,375	483	147	70.1	4.4	26.0	30.8
California	802	344.0	5.6	125.6	254.0	18,711	835	9,737	19,107	900	373.7	14.5	125.5	394.4
May 20, 1950	5,477	2,654.3	305.7	1,009.7	1,062.1	124,669	14,648	39,432	39,330	5,195	2,585.4	237.5	812.9	1,138.0
May 13, 1950	5,427	2,609.1	292.4	1,025.3	1,101.0	125,851	13,916	38,139	39,255	.....	.....	.....	.....	.....
May 21, 1949	5,307	2,604.3	253.7	882.4	1,193.4	120,797	20,664	54,351	62,884	.....	.....	.....	.....	.....

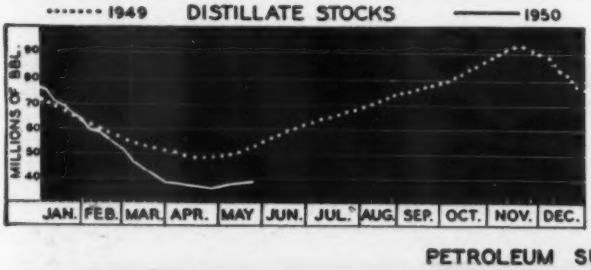
*At refineries including natural blended. †Finished and unfinished.

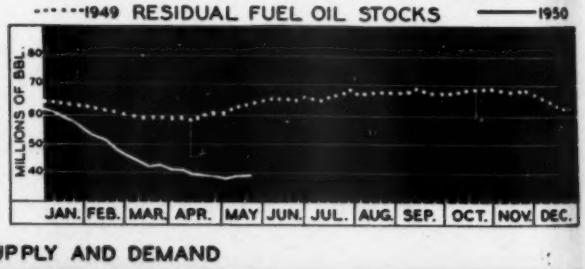


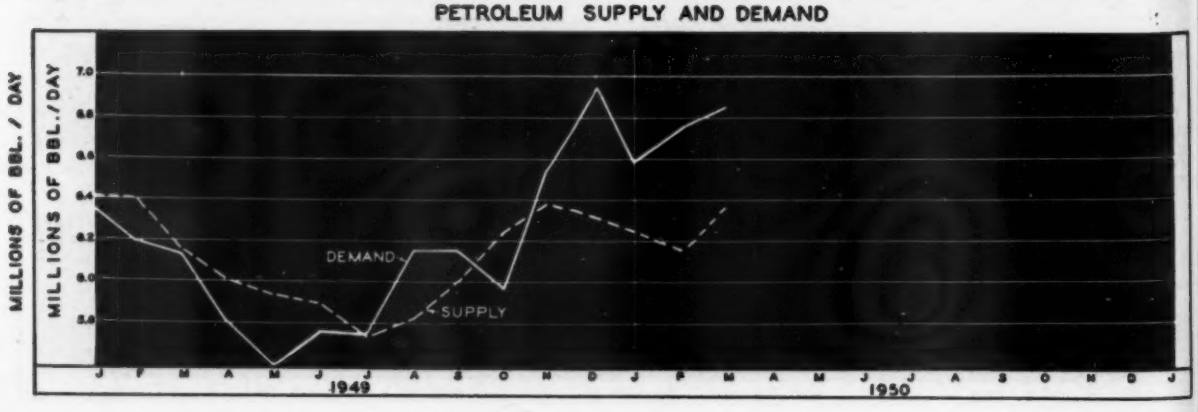












CRUDE PRICES

GRAVITY SCHEDULE

Gravity—	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.53	....	....	...
19-19.9	1.63	....	....	....
20-20.9	1.73	$2.25	....	$2.12
21-21.9	1.82	2.27	....	2.14
22-22.9	1.92	2.29	...	2.16
23-23.9	2.02	2.31	....	2.18
24-24.9	2.12	2.33	$2.56	2.20
25-25.9	2.22	2.35	2.58	2.22
26-26.9	2.31	2.37	2.60	2.24
27-27.9	2.37	2.39	2.62	2.26
28-28.9	2.42	2.41	2.64	2.28
29-29.9	2.48	2.43	2.66	2.30
30-30.9	2.54	2.45	2.68	2.32
31-31.9	2.59	2.47	2.70	2.34
32-32.9	2.64	2.49	2.72	2.36
33-33.9	....	2.51	2.74	2.38
34-34.9	....	2.53	2.76	2.40
35-35.9	....	2.55	2.78	2.42
36-36.9	....	2.57	2.80	2.44
37-37.9	....	2.59	2.82	2.46
38-38.9	....	2.61	2.84	2.48
39-39.9	....	2.63	2.86	2.50
40 and above	....	2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947. Above changes do not include recent reductions of a few buyers applying principally to low-gravity grades.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

East Texas†	$2.65
Kettleman Hills, California*	2.77
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	3.65
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°. †35° and above.

MOST suppliers have raised kerosine and No. 2 distillate prices in the East Coast marketing area following the increase announced by Esso Standard Oil Co. The general posting for barge deliveries of kerosine is 9.1 cents a gallon, and formal postings for No. 2 are 8 cents. However, a good portion of the spot movement in the Harbor, particularly sales to customers on the New Jersey side, is going at a discount of .4 cent off posting. This is the pattern that is generally followed on price increases in the Harbor area. On an increase, most suppliers will accept posting, but a few will offer discounts that bring the actual selling price back to the old posting. If the market continues strong, these discounts will be discontinued. If the market weakens, spot quotations will drop back to the original level. It may take another week or two for distillate prices in the area to stabilize.

The general tightness in heavy-fuel supply for the East Coast during the next 12 months was indicated by the bidding on a contract calling for barge delivery of residual fuel for use by departments of New York City. Only five bids were received for the contract which called for delivery of 574,000 bbl. in the period July 1, 1950 to June 31, 1951.

Mid-Continent gasoline prices were up about .125 cent a gallon in a very firm market. More heavy fuel is reported available on the Group 3 market with some low-sulfur moving at $1.65 per barrel. However, these seem to be only small-lot shipments, and premiums are offered for volume deliveries of low-sulfur material. No actual distress selling is indicated. Within the past few weeks the lube-oil market has taken a definite trend toward better prices. Domestic demand for lube oils in the first quarter of this year was 17.6 per cent greater than in the first quarter of 1949. Lube exports were up about 4 per cent.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of May 29, 1950. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 80-82 octane	10⅛-10⅜	11.5-12	10¼-10¾
Premium gasoline, 86-88 octane	10¾-11½	12.5-13	11-11½
42-44 w.w. kerosine	8½-8⅝	9.1	8-8½
No. 2 straw fuel oil	7⅝-7¾	7.6-8.0	7-7¼
No. 6 residual	$1.65-1.75	$2.05	$1.65-1.80

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5⅛	4⅝	4⅞
Grade 18-55	6.15	5.65	5.9

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	10.5
750 vis., No. 3-4 neutral	12.75
2,000 No. 5-6 neutral	14-14.5

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	17-18
200 vis., No. 3 neutral, 0-10 pp.	11.5-12.5

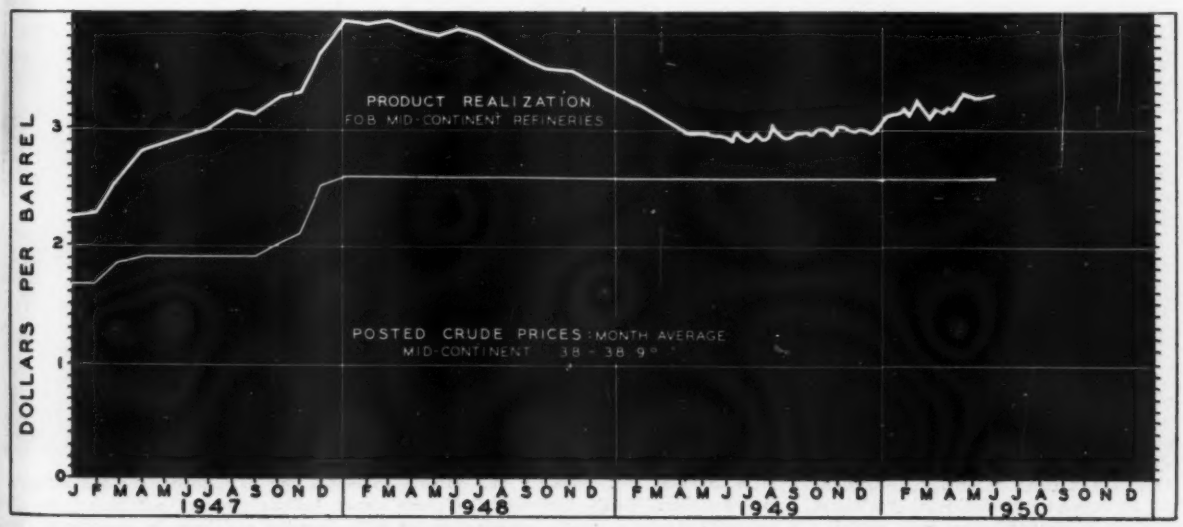
Western Pennsylvania

145-155 vis., 10 p.t. bright stock	20.5
180 vis., 0 p.t. neutral	21.5

WAX

Mid-Continent

132-134 A.M.P.	4.50


PRODUCT REALIZATION
FOB MID-CONTINENT REFINERIES
POSTED CRUDE PRICES: MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
DOLLARS PER BARREL
0
1
2
3
J F M A M J J A S O N D
1947
F M A M J J A S O N D
1948
F M A M J J A S O N D
1949
F M A M J J A S O N D
1950

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil. Realization averaged $3.33 for week ended May 20, $3.28 for previous week, and $2.98 for May 1949.

XUM

EQUIPMENT MEN . . . in the News

Byron Jackson Makes Sales Department Changes

B. A. Hilliard, Jr., general sales manager of Byron Jackson Co., oil-tool division, has announced the transfer of Jack File as sales representative. The new assignment for

JACK FILE

E. R. KOBERG

File, who will operate out of Wichita Falls, Tex., includes coverage of Central Texas oil fields. He was transferred from Bakersfield, Calif., where he had been representative in the San Joaquin Valley.

C. F. Vincent, Mid-Continent sales manager, oil-tool division, has announced the promotion of E. R. Koberg to district manager for the Louisiana, Arkansas, and Mississippi area, and the appointment of John W. Cronin, Jr., as sales trainee.

Koberg, who has been at B.J. Mid-Continent headquarters at Houston for the past year and a half, will make his headquarters in Baton Rouge. He attended University of Buffalo and Louisiana State University. After graduation, he spent 8 years with National Supply Co. and then opened a sales office for Murray-Brooks, Inc., in New Orleans.

Cronin is a graduate of Texas A. & M. College and formerly was assigned with the B. J. Magnaflux unit which checked equipment in various oil fields in California and the Mid-Continent areas. He will cover South Louisiana and Mississippi fields.

Hagan Makes Schuhmacher Los Angeles Manager

Gordon S. Schuhmacher has been appointed district manager in Los Angeles for Hagan Corp., Pittsburgh combustion and chemical engineering firm, and its subsidiaries, Calgon, Inc., Hall Laboratories, Inc., and Buromin Co. He succeeds R. L. Sullivan, who resigned.

D. J. Erikson, president of Hagan Corp. and subsidiaries, also announced that Schuhmacher will be assisted by Joseph R. Shafer. Schuhmacher joined Hagan Corp. in 1942 for service in the Los Angeles territory. Prior to this date he was associated with Consolidated Steel Corp. at Wilmington, Calif.

Shafer joined Hagan in 1941 as a service engineer. He is a graduate of California Maritime Academy, with a B. S. degree in mechanical engineering.

Isham Named as Director Of Dresser Industries

Henry P. Isham, president of Clearing Industrial District, Inc., of Chicago, has been elected a director and member of the executive committee of Dresser Industries, Inc.

H. P. ISHAM

Isham, a graduate of Yale University, also is a director of the following organizations: Marshall Field & Co., First National Bank of Chicago, American Shipbuilding Co., and Clearing Machine Corp. Passavant Memorial Hospital. Dresser Industries recently announced the removal of its executive offices to Dallas.

Hoagland Appointed Vice President of Utah Fuel

Appointment of Richard E. Hoagland as vice president and assistant general manager of Utah Fuel Co. has been announced by Jack L. Ashby, vice president of the parent company, Kaiser Steel Corp.

R. E. HOAGLAND

Prior to this appointment, Hoagland served as manager of byproduct sales for Kaiser Steel Corp., with headquarters in Los Angeles. Hoagland will take up headquarters in the offices of Utah Fuel Co. in Salt Lake City. He joined Kaiser Steel 5 years ago as general credit manager before becoming manager of byproduct sales. He is a graduate of Fresno State College.

Killeen Co. to Represent Hammond in West New York

Appointment of the T. F. Killeen Co., Buffalo, as Western New York State representative, has been announced by Hammond Iron Works, Warren and Bristol, Pa., designers, fabricators, and erectors of steel storage tanks.

Western Gear Delivers First Speed Increasers

B. A. Bannan, vice president and general manager, and B. J. Bannan, plant manager, Western Gear Works, Lynwood, Calif., are shown holding the sign publicizing the first shipment of precision gear speed-increasing units designed and built by the firm for use on a Texas-to-Ohio pipe line. The 1,200-hp. units will serve to transmit power from diesel engines to high-speed multistage centrifugal pumps, multiplying the engine speed by a ratio of from 8 to 1 up to 10 to 1.

A-1 Opens Beaumont Warehouse and Office

To serve its customers in the Sabine district, A-1 Bit & Tool Co. has opened this new warehouse and office at Beaumont, Tex. A complete stock of A-1 tools will be carried at the new location. Personnel of the new branch are Sam Sutton, service operator; M. A. Smith, salesman; and Joe Castles, district manager.

Oil Center Tool Names Galloup as Sales Manager

R. E. GALLOUP

Rex E. Galloup, former district manager in the West Texas - New Mexico area, has been promoted to sales manager of Oil Center Tool Co., John Maher, president, announced recently. He will make his headquarters in Houston.

Galloup joined the O-C-T sales organization in October 1946 as a salesman. He was promoted to district manager in the West Texas area in September 1949. A graduate of West Texas State College, Galloup has been associated with the oil industry for more than 20 years. He formerly was employed by Natural Gas Pipeline Co. of America, Halliburton Oilwell Cementing Co., and Orbit Valve Co.

Geist Serves Ninth Term as Allis-Chalmers President

Stockholders of the Allis-Chalmers Manufacturing Co. have elected Walter Geist to his ninth term as president of the company, and reelected all other officers and directors.

Directors renamed at the annual meeting are James M. Barker, Chicago; Fred O. Bohen, Des Moines; W. C. Buchanan, Milwaukee; Hugh Comer, Sylacauga, Ala.; James D. Cunningham, Chicago; W. C. Johnson, Milwaukee; Walter Kasten, Milwaukee; Ernst Mahler, Neenah, Wis.; Louis Quarles, Milwaukee; Leigh Willard, New York; and W. A. Roberts, Milwaukee. Geist also was reelected to the board.

Reelected as officers in addition to Geist are Johnson, executive vice president in charge of the general machinery division; Roberts, executive vice president in charge of tractor division; E. H. Brown, vice president in charge of engineering development; W. E. Hawkinson, secretary and treasurer; J. A. Keogh, vice president and comptroller; J. L. Singleton, vice president and director of sales for the general machinery division, and H. W. Story, vice president and general attorney.

Other officers renamed by the board are C. P. Allendorf, assistant comptroller; N. D. Johnson, assistant secretary; G. F. Langenohl, assistant treasurer, and J. F. Ryan, assistant secretary and assistant treasurer.

Huff Appointed Manager by Northern Testing Firm

Walter Huff has been appointed manager of Northern Testing Laboratories, Ltd., F. H. Dietrich, president of this Canadian formation testing company has announced.

After graduation from University of British Columbia in chemical engineering, Huff served as a mud engineer with Mene Grande Oil Co. in Venezuela. On his return to Canada he specialized in the design of oil tools and testing instruments for production evaluation.

As manager of Northern Testing Laboratories, Huff will be located at the main branch office in Edmonton and will aid in supervision of formation testing activities in western Canada.

Hack to Manage Ethyl Product Development

Appointment of William T. Hack as manager of the product - development department has been announced by Ethyl Corp. A former member of the product department staff, he first joined Ethyl in 1946 and resigned 2 years later to accept appointment as director of the chemical and rubber division of the National Security Resources Board, Washington, D. C.

For 6 years prior to the war, Hack was an engineer with Carbide & Carbon Chemical Corp. From 1942 to 1946 he was with the Office of Rubber Reserve where he served first as production manager of the butadiene-from-alcohol section and later as assistant production manager of the synthetic - rubber section. Hack was graduated from Princeton in 1935 with a B. S. degree in chemical engineering and attended the graduate school of business administration at Harvard University.

(Continued on page 135)

Wilson Supply Co. Opens Liberty Store

Wilson Supply Co. recently opened this new store at Liberty, Tex., because of the increased drilling activity in that territory. Shown at the branch are Roy Layton, driver; Reed Whitten, field man; Don Collins, store man; C. C. "Red" Hardamon, store manager; W. D. Wilson, president of Wilson Supply Co.; S. G. "Doc" Wyatt, manager of stores; and John Yerger, Oil Well Manufacturing Co.

XUM

CLASSIFIED ADVERTISING

Your MARKET PLACE FOR THE OIL AND GAS INDUSTRY...

DISPLAY CLASSIFIED
$12.00 a column inch one issue . . .
10% Discount three or more issues.

UNDISPLAYED CLASSIFIED 12c a word one issue. 10% Discount three or more issues. $3.00 minimum charge. Blind Box in our care counts nine words. Payable in Advance.

EQUIPMENT FOR SALE

ONE new 40′ x 40′ x 12′ corrugated aluminum building; double sliding door; single door and window; steel structure. Located: Bunkie, Louisiana. Anchor Gasoline Corp., Phone 54-5201, Tulsa, Oklahoma.

REBUILT BOILERS
150 HP. Walsh-Weidner Water Tube Type Boiler. Complete with standard trim. Peerless Boiler Company, 421 North Cincinnati, Tulsa; 2015 NE Park Place, Oklahoma City.

LIGHT PLANT: 3,000 watts, 120 volts AC, continuous duty powered by 4 cylinder Hercules, self-starting, all-weather hoods. Used 80 hours. Bargain. L. C. Hamilton Co., Muskogee, Oklahoma.

1 COMPLETE String of Rotary Drilling Tools: Ideal Drawworks, Wheland Clutch, 7¼ x 14 New Type Wheland Pump, Waukesha Motors, 3600′ 4½″ Drill Pipe, 122′ Lee C. Moore Champion Rotary Derrick, Tool House and all necessary equipment goes with this rig. Anyone interested either write H. M. Williams Drilling Company, 701 Bitting Building, Wichita, Kansas, or telephone 48542.

COMPRESSOR CYLINDERS & COMPRESSORS—All Sizes
6″ to 26″ by 20″ Stroke Bessemers—Coopers—Clarks.
10″ x 4¼″ x 10″ XOB Ing. Rand.
8″ x 8″ XRB Ingersoll-Rand.
W. S. SMITH
295 Thompson Bldg. Phone 2-5473
Tulsa, Oklahoma

Several Army Surplus 4½″ x 6″ Gaso Duplex 1880 Pumps—two piece skid mounted with Chrysler 8 cylinder engines. Will sell pumps only or complete units about half price.
H. H. COFFIELD
ATTN: W. H. Orr
Phones: 132—Hockdale, Texas
A-66064—Houston, Texas

COMPLETE PORTABLE DRILLING UNIT

1—K-11 I.H.C. Drill Truck with Failing #55 Drill equipped with 54 Ft. mast, complete with all tools.

1—KB-10 I.H.C. Pump Truck with 1 5″ x 10″ Wheatley Pump & 1—5″ x 6″ Gardner-Denver Pump mounted on truck. Pumps are equipped for slush service.

1—4-Wheel Trailer with Tool House mounted on Trailer.

3,000 Ft. 2⅜″ OD Drill Pipe with 4⅛″ OD Tool Joints.

1—KS-8 I.H.C. Water Truck with 1,000 gallon tank.

All of the above equipment is complete, in excellent condition, and ready to drill; located in Tulsa, Oklahoma.

Contact
W. B. KENDALL
2607 No. Boston Pl.
Tulsa, Oklahoma, Telephone 3-6151.

EQUIPMENT FOR SALE

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

COOPER Single Drum Winch Tractor, Model W-201-26, with 45-foot mast, A-1 condition. $2250.00. Rogers Pipe & Supply Co., Tulsa, Phone 3-2072.

FOR SALE: Wilson Mogul drilling rig with portable derrick complete. Suitable for 4500′ depth. Now running in Bebee Field, Pontotoc County, Oklahoma. Contracts available. Lake Oil Company, Ada, Oklahoma.

SPUDDERS: Good used equipment. Fort Worth Models Super H. and C. Wichita 55. Wilson rotaries. Franks and Longyear machines. New and used tools and supplies. Fishing tools rented. Everything for well drilling. Pressey & Son, Pueblo, Colorado.

FOR SALE: 1—Wilson Mogul double drum cable tool rig powered with Waukesha engine. Has cable tool and rotary drilling attachments. Rig in good workable condition. P.O. Box 128, Overton, Texas. Phone 32F1.

FOR SALE: National "75" with 2 Engine Rig Drive, Wilson "Giant" with Dual Engine Drive, RX1SV 12-Cyl. LeRoi, Two RX1V 8-Cyl. LeRois, C-12 (7¼x12) Emsco Power Pump, D-13000 Caterpillar, PA-100 International, WOKU Waukesha, Radiator for WAKU Waukesha. Jones, Shelburne & Guffey, Inc., 501 N.E. 26th, Oklahoma City, Oklahoma. Phone: 5-5448.

FOR SALE
9 tons Johns-Manville 7TF5 Asbestos Fibre. $37.50 per ton f.o.b. Bartlesville, Oklahoma.
Contact: LEO CARLE
H. C. PRICE CO.
Box 1111, Bartlesville, Phone LD-8

PACKAGED H_2S REMOVAL UNITS
We offer prompt shipment on skid-mounted hydrogen sulfide removal units for treating sour gas for pipe line or fuel gas purposes.
GRAFF ENGINEERING & EQ'PT. CO.
3415 Westminster, Dallas 5, Texas

FOR SALE
Perfect Operating Condition
One 750 KVA and One 1000 KVA
G.E. Turbo-Generators
THOMAS BRYAN AND ASSOCIATES, INC.
620 M & M Bldg.
Houston, Texas

EQUIPMENT FOR SALE

CULVER Vertical Furnaces for exfoliating Perlite $10,000 compared to $100,000 for old style, also purest of Perlite for sale. Particulars Box 2153-OJ, Denver, Colo.

CORE Drill Equipment for Sale: Two "Franks" truck mounted core drills, 2,000′ capacity; one shop built truck mounted core drill, 1,600′ capacity. All mounted on KB-11 International trucks. Four KB-7 International oil field trucks with jin poles and model 34 Tulsa winches. Four pole trailers with bolsters, three of them equipped with dollies for holding pipe loads. Approximately 2,500′ used 2⅜″ x 20′ drill pipe with 3⅜″ tool joints. Contact Mr. K. J. Reid or Mr. W. H. Hawkes, P.O. Box 1654, Oklahoma City. Telephone 2-6381.

1—Shot Hole Drill Truck, Chassis WHAX 1947 Dodge, Mayhew Drilling Unit—Model 600 Complete w/ Gardner-Denver 4½x3 mud pump. Mast 19 feet—Kelly 12½ feet. 100 feet 2⅜″ Used Drill Rod. 3—Dodge Water Trucks: 2 Ton Chassis WHAX—2 Ton, 400 Gallon Tank, Tulsa 18—Winch. 1—Model DDH—Oliver Cletrac Tractor w/ Hercules 6 cylinder Diesel Engine, Electric Starter and battery ignition complete with southwest cable controlled trailbuilder and Buckeye Double Drum Power Control Unit. If interested, write or call The Atlantic Refining Company, c/o Mr. V. H. Gray, P. O. Box 2819, Dallas, Texas, Telephone P7-6434, Station 8-273, Dallas.

FOR SALE: One Gumbo Buster 28″ Oil Bath rotary table in good running condition. Attractive price. Melton Supply Company, Box 1360, Semniole, Oklahoma.

FOR SALE: Portable deep well servicing rig. Cardwell model H, code HSMZS, serial No. HS-951, single drum hoist with 8″ x 7″ telescoping mast. Powered with 6MZ Waukesha with gas-gasoline carb., regulators and volume tank. Unit is mounted on 1948 model 25 VBS 5 ton Reo truck. This equipment in good shape and has had very little use. $8750.00. Marena Oil Co. Box 720, Cut Bank, Montana.

For Sale at a Bargain

9520′—1¼″ External upset tubing.
14—GOT Type "G-JR" Pressure Controlled Valve w/ 2 6/64″ Ports
10—GOT Type "G-JR" Pressure Controlled Valves w/ 2 1/8″ Ports
24—GOT Type "G-JR" 1¼″ Mandrels
1—GOT Type "A-1" Surface Controller Serial #498
1—Fisher Controller, Type 4367F, Serial #837391
1—1¼″ Tubing Hanger
1—GOT Type "O-JR" Pressure Controlled Valve, Serial #183-800#
1—B. M. W. Anchor, 1¼″ for 2½″ Tubing
1—GOT Type "O-JR" Reverse Check
1—GOT Type "O-JR" 1¼″ Mandrel

ALL TO BE SOLD TOGETHER

All equipment new when run in and out of hole. Can be inspected at our warehouse at Cyril, Oklahoma.

The Palmer Oil Corp.
Wichita, Kansas

EQUIPMENT FOR SALE

FOR SALE: 1—1944 Model LMSWM Mack Tandem with NH-600 Cummins Diesel engine, Brown Lipe with Power Tower, 11:00 x 24 rear tires, 14:00 x 24 front tires, Garrison power steering, heavy duty oil field bed and winch, has gin pole lifts. Good Condition. Commercial Truck Company, 713 Texas Avenue, Lubbock, Texas. Phone 4380.

BOILERS FOR SALE: 18 Code Oil Field Boilers, 50 to 87 H.P., 100 to 200 Lbs. W.P., Operated under Hartford into 1948, not fired since. Located on Leases vicinity Pampa, Texas. Offered subject to prior sale $500.00 to $700.00 Each, as is where is. Contact W. L. Godfrey or Max Harbison, Kewanee Oil Company, Pampa, Texas.

FOR SALE: One 7¼ x 14 Whelan model 11000 Slush pump. New fluid end, gear box A-1. Melton Supply Company, Box 1360, Seminole, Oklahoma.

FOR SALE: Boilers, Tanks & Pumps. 15 new vertical 500 bbl. bolted tanks, crated. 4 used 100,000 gal. 9/16" plate. 4—67,500 gal. ¼" plate. 2 new Deming Deep Well Pumps with Sheppard Diesel, 100 gpm @ 100' head with casing and spare parts. 1—100 H.P. Farrar & Trefts Locomotive Boiler 300# w.p. with stack and grates. H. Loeb & Son, 4643 Lancaster Ave., Philadelphia 31, Pa.

FOR SALE: Two Complete Motor Oil Reclaiming Units, including 2 Filter presses, Bowser Automatic Blending Meters, Agitators, 10—1½" Pumps with 3 H.P. 220-440 Volts, 3 Phase Direct Connected Explosion-proof motors. 10—1" Pumps with 2 H.P. Direct Connected Explosion-proof Motors. 10—1" Pumps with 1½ H.P. Direct Connected Explosion-proof Motors. Write Box D-525, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: Two used 5,000 Bbl. Bolted Steel Tanks with stairway. $3,400 for them knocked-down Hawkins, Texas. Hanson Tank Company, Box 428, Kilgore, Texas.

FOR SALE: Model L-107 Allis-Chalmers Fred E. Cooper winch unit for deep well servicing. Excellent condition. Priced to sell. Degen Pipe & Supply Co., Box 107, Red Fork Station, Tulsa, Oklahoma.

EQUIPMENT

100 OCTANE REFINERY

Cotton Valley, La.

5—Upshot heaters — U.O.P. type Vogt—Kellog—G-R exchangers & condensers. Fractionating columns. Drums and pressure vessels.

I-R—B-J—National Transit—Union — Hills-McCanna—Worthington centrifugal, reciprocating, steam, turbine and motor driven pumps.

SEND FOR COMPLETE LISTINGS

DULIEN STEEL PRODUCTS, INC
of Washington
P. O. BOX 667
COTTON VALLEY, LA.
PHONE: COTTON VALLEY 26

EQUIPMENT FOR SALE

USED ROTARY AND CABLE TOOL DRILLING TOOLS, WIRE LINES. E. A. KELLY, BOX 861, OKLAHOMA CITY. PHONE 5-8407.

FOR SALE: 1—36-L Bucyrus Rig, 1948 model, complete with all tools. Phone 2032, Henderson, Kentucky.

FOR SALE: In our Geological Department here, 3 large mahogany Wall Map Cases. Cities Service Oil Co., Patridge, Bartlesville, Oklahoma.

FOR SALE: Super Model Wilson skid winch, powered with 6-MZR Waukesha engine. Priced less than 50% of new cost. Melton Supply Company, Box #1360, Seminole, Oklahoma.

FOR SALE: Pipeline Equipment: TD-18 International Tractor with Isaacson angledozer. Cleveland Trencher Model 140-A Diesel Power. Two D-4 Caterpillar Tractors with Trackson Sidebooms, one with angledozer. 300 Amp. Lincoln Welder. Heco Pipe Cleaning Machine. 10 Barrel Tar Pot on wheels. Pole trailer. This equipment completely reconditioned, painted and first-class condition. Attractive price if taken in one lot. F. B. Anderson, Inc., 809 Interstate Trust Bldg., Denver, Colorado. Phone Alpine 5933.

FOR SALE—Several used Mayhew 1000 and 600 rotary type drills, mounted on 2-ton Chevrolet trucks. Many in operation at present. Inquire at 8800 Lemmon Ave., Dallas 9, Texas. Phone Dixon 4-2671.

FOR SALE in Siler Trucking Company's Yard, Craig, Colorado, 828' of new 6⅝" OD 24# 8 RT, J55 ST&C SS Casing. $2.00 per foot. Cities Service Oil Co., Patridge, Bartlesville, Okla.

FOR SALE USED ENGINES: 2 model 1879 Supercharged Buda Diesels, recently overhauled. $1500.00 each. Diesel Equipment Co., Inc., Wichita, Kansas, or Great Bend, Kansas.

F.M. DIESEL ENGINE FOR SALE
1 F.M. Diesel Engine, two Cyl, Vertical Heavy Duty, Type Y, Style VA, 120 HP, 257 RPM, Direct connect to F. M. A. C. Gen. 75, KW, 3 Ph. 60 Cy., 257 RPM, 240 v with Belted Exciter Complete with circulating water pump, oil filter, oil storage tank, switchboard with O. C. B., Voltmeter, ammeter rheostats, and voltage regulator. Engine has been completely redone, overhauled, fitted with new bearings, rings, rewound generator, etc. Price $3,000 f.o.b. Montgomery, Ala. Write Box D-528, The Oil and Gas Journal, Tulsa, Okla.

SHERIFF'S SALE, for Cash, at Courthouse, Wagoner, Oklahoma, June 15, 1950, 10 A. M. Watts Oil and Gas Compressor made by Miller Gas Engine Company, Springfield, Ohio, Shop No. 1405; one extra cylinder, sheet-iron house, one 25 H.P. Marion Gas Engine located 4½ miles west of Wagoner on Highway 51 on SE of S. 10, T. 17, R. 17.

WAR SURPLUS MACHINERY
Gaso, Byron Jackson, Aurora, Wayne, Lombard, & Hale Fire Pumps with Engines, 1½ to 25 KW Generator Sets or Light Plants, Engines, Suction Hose, Fire Hose, Victaulic Couplings & Etc. Write for listing. H. A. McCarthy, 310 Thompson Bldg., Phone 5-3296, Tulsa, Oklahoma.

FOR SALE at our Lacy Plant, Seminole Field, 3—10' x 40' Horizontal Welded and Riveted Gasoline Storage Tanks. Cities Service Oil Co., Patridge, Bartlesville, Oklahoma.

FOR SALE
(SUBJECT TO PRIOR SALE)
3 Bolted tanks, 2 in original crates and one assembled, (100 Bbl.). 69'-14" 57# Drive Pipe; 170'-10¾" 41# Drive Pipe; 407'-10¾" 32.75# Casing 8Rd. Thd. Smls.; 3045'-8" 24# Casing 8Rd. Thd. Smls.; 6286'-7" 23# Casing 8Rd. Thd. Smls.; 8101'-3" 9.20# Tubing Smls.; 1453'-2½" Tubing EUE Smls.; 14,226'-2" 6.40# Regular 10Rd. Thd.; 375'-¾" Pumping rods; 9-5" Orbit Gate Valves; 9-3" Orbit Gate Valves; 3-2" Orbit Gate Valves; 3-2⅛" x 6" Parmco Combination Packer; 1-2⅞" x 6" Larkin Screw Trip Packer; 1-3" x 6" Parmco Packer; 1-2⅞" x 6" Gas Anchor Packer. M. B. Belden Office at 425 2nd St. N. W., Canton 2, Ohio, Phone 4-6147.

FOR SALE: One, type-100 National Drilling Rig has drilled only two wells. With 800,000 pounds capacity jack-knife derrick. Box D-448, The Oil and Gas Journal, Tulsa, Oklahoma.

EQUIPMENT FOR SALE

FOR SALE: 3500' capacity rotary, truck mounted, 55' mast, 5 x 10 G-D pump. Or will contract for cash and interest. Reply Box D-515, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: 36-L Bucyrus Erie complete with tools. Well Driller, 1625 Court Manor, Owensboro, Ky. Phone 3-6651.

FOR SALE: New 1¼" Improved plow steel wire lines 6 x 19 R L Hemp Core. One Spool 3500' at 28c per ft. Four Spools 1800' at 24c per ft. Thirty Spools 600' at 20c per ft. FOB Okla. City, Okla. General Tool & Supply Co. P.O. Box 4387—1319 S.E. 29th. St., Okla. City, Okla.

EQUIPMENT WANTED

WANTED TO BUY: Used Core Rig, Failing 1500 or similar make, suitable for rebuilding. Must be cheap. Bowie Machine Works, Bowie, Texas.

INTERESTED in small portable double-mast rig, capable of drilling to approximately 2000 feet, with or without drill pipe. Equipment must be in good condition and reasonably priced. Preferably located in Southwest Texas. Contact:

MAKIN DRILLING COMPANY
Box 131, Hobbs, New Mexico, Phone 131

HELP WANTED

EVALUATION ENGINEER—A progressive and substantial Mid-Continent oil company desires the services of a fully qualified oil property evaluation and/or appraisal engineer. State age of applicant, scholastic training, former affiliations, years and record of experience, present assignment, date of availability, and expectant salary. All applications will be held confidential. Address all inquiries: Box D-486, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED: Process Engineer, prefer one with five years or more experience. Southwest Refinery, Box D-497, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL MEN WANTED!

MERCHANDISING MANAGER ..... To **$15,000**
Under 45; College Graduate; Good personality; heavy petroleum exp., both bulk and package. Salary tho stated is open and is subject to bonus. They want a top man.

MARKETING ACCOUNTANT ..... To **$7,200**
Young, under 35; Coll. Grad.; Must have exp. with oil company; knowledge of I.B.M. valuable.

REFINERY ACCOUNTANT ..... To **$7,200**
Young, under 35; Coll. Grad.; Staff Acct. operate between controller and refineries; must know catalytical acctg.

Above positions with one of really top oil companies. Our client pays fees on these positions; will also pay for relocating you. They offer a real opportunity to join a fine organization with whom you will be proud to be associated. All replies will be treated confidentially.

Call, Write or Wire

CADILLAC EMPLOYMENT AGENCY
220 So. State St. WAbash 2-4800
Chicago 4, Ill.

XUM

HELP WANTED

WANTED: YOUNG PETROLEUM ENGINEER. Chemical Engineering graduate, familiar with petroleum refining processes and equipment—for career training as specialized insurance adjuster by large midwest organization. Prefer man under thirty years of age and several years experience with major oil company. Reply giving education, details of personal and employment history, present salary and reasons for wanting occupational change. Responses will be treated confidential. Reply Box D-506, The Oil and Gas Journal, Tulsa, Oklahoma.

LARGE responsible organization is establishing a petroleum and natural gas statistical division and desires the services of a Canadian resident geological engineer with educational qualifications and at least two/three years' practical experience. Good opportunity for right individual. Applications should be by letter to the undernoted box number, accompanied by photograph, and should include qualifications, references and state present salary if employed and, if not, last salary. Box D-513, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST wanted by old independent oil company with substantial production and financial backing. Must have varied experience in West Texas and/or other MidContinent areas, and be capable of heading department. State age, scholastic training, former affiliations, years and record of experience, present assignment, date of availability and expected salary. All applications will be held confidential. Address: Box D-518, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED
COMPRESSOR MAINTENANCE MAN

Thoroughly experienced with Clark, 2 Cycle 440 HP Double Acting Compressors. Give detailed information on experience, also personal information and salary expected in first letter. Write Box D-522, The Oil and Gas Journal, Tulsa, Oklahoma.

SALESMAN

Leading manufacturer of specialty equipment for drilling contractors, oil tool shops, etc., wants salesman for Texas, Louisiana area to sell proven, highly regarded equipment. The recognized "top line" in the industry. The man must have good sales record, though may be young. Excellent opportunity. Reply Box D-494, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES ENGINEERS
OPERATIONS SUPERVISORS
PERFORATOR OPERATORS

Only Experienced Men Need Apply.

WRITE ONLY

WELEX JET SERVICES, INC.
3909 Hemphill Street, Fort Worth 9, Tex.

MUD ENGINEERS

Only experienced men in sales and servicing need apply. Good pay, with merit bonus. All replies kept confidential.

P. O. BOX 5156

Tulsa, Oklahoma

SALES ENGINEER

Wanted by fast growing young company making important product for protecting underground pipe from corrosion. Should be graduate engineer, preferably mechanical or chemical with experience selling to pipe line industry or oil and gas industry. Age 30 to 45. Extensive traveling. Salary and expenses. Position offers opportunity for growth with company.

Reply in confidence.

Write Box D-529

The Oil and Gas Journal
Tulsa, Oklahoma

HELP WANTED

FOREIGN and Domestic Oil Employment Directory (including late supplement of oil companies and drilling contractors in Western Canada). Over 500 listings in drilling, production, refinery, natural gasoline, pipelines, geological, exploration, supplies, manufacturers, services and refinery and pipeline contractors, showing where to apply for jobs. Price $5.00. Oil Industry Mailing List, Box 2603, Tulsa, Okla. (Our 30th year)

WANTED: COMBINATION Petroleum Engineer and Geologist for vice president and executive of well-established independent oil company located in Dallas. Must be man of unquestionable integrity. Must have extensive geological knowledge of West Texas area and wide experience in drilling and production practices. Salary open and investment privileges. State salary expected. Replies strictly confidential. Box D-499, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES REPRESENTATIVES

Soundly established, progressive firm has openings for three district sales representatives. Experience in pipe, valves or fittings an asset. Excellent opportunity. Write Box D-516, The Oil and Gas Journal, Tulsa, Oklahoma, stating complete detailed background. All communications confidential.

SITUATIONS WANTED

PRODUCTION MANAGER-SUPERINTENDENT. 10 years' supervisory experience development and production in Mid-Continent and Rocky Mountains. Capable complete responsibility for drilling and production programs. Graduate Engineer. Age 36. Desire responsible connection with active organization. Now employed responsible position. Change desired due curtailment employer's activities. Record and details on request. Box D-512, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. 131, Ph. No. 131, Hobbs, New Mexico.

PETROLEUM Chemist-technologist, Ph.D. Family. Chief Chemist or Assistant Superintendent. 15 years' experience laboratory management, products control, research, development and technical service. Available soon. Box D-510, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST. Executive Geologist desires change. Fifteen years' experience over United States and Canada. Unusually competent in planning and supervising major exploration programs. AB and MS degrees in Geology. Now employed. Box D-521, The Oil and Gas Journal, Tulsa, Okla.

CORROSION ENGINEER: Experienced, currently employed, seeks connection with major pipeline company or refinery; would consider retainer arrangements with several smaller companies. Box D-517, The Oil and Gas Journal, Tulsa, Oklahoma.

DESIRES CHANGE: Trained in supervision operation crude distillation, Thermal and catalytic cracking, alkylation, polymerization, stabilizers, Blending, treating, testing—industrial management. Any reasonable offer. Box D-526, The Oil and Gas Journal, Tulsa, Oklahoma.

LANDMAN-LAWYER—Over ten years experience East Texas and Gulf Coast. Refer Box D-523, The Oil and Gas Journal, Tulsa, Oklahoma.

EXECUTIVE ACCOUNTANT, CPA Fifteen years diversified accounting and tax experience, principally in Oil Industry. Desires change. Box D-524, The Oil and Gas Journal, Tulsa, Oklahoma.

JOB ANALYST, petroleum industry, trained all phases wage-salary control, job evaluation, methods and procedure simplifications. Box D-527, The Oil and Gas Journal, Tulsa, Oklahoma.

PATENT ATTORNEYS

PATENT Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine & Rommell. Registered Patent Attorneys, Suite 418, 815-15th Street, N.W., Washington 5, D. C.

WANTED

WANTED: SURPLUS Chemicals, Oils, Waxes, Solvents, Wastes and Residues of all kinds. Chemical Service Corporation, 98-06 Beaver St., New York 5, N. Y.

WANTED: Partner for Shallow Well Drilling Rig capable of 3,000 feet. Partner must have some capital. Must be capable of making contacts and supervise drilling operations. Rig located in South Texas. Reply to P. O. Box 127, Falfurrias, Texas.

LEASE AND DRILLING BLOCKS

FOR SALE: Limited number oil and gas leases in NW Beaver County, Oklahoma, Township 6, Range 20. Contact: W. A. Franks, Route 1, Liberal, Kansas.

OFFERING 30,000 acres leases Valencia County, N. Mex., 10,000 Hidalgo County, 6,000 Torrance County, $1.50 acre—17,000 acres Wallace County, Kansas, $1. Write if interested, Box 2153, Denver, Colo.

OIL LEASES, drilling blocks, near test wells to be drilled, in Morgan and Macoupin Counties. Gas wells, and oil at 400 feet; One log shows five shows of oil to 1790 feet. S. J. Burkitt, Moweaqua, Illinois.

IF you've got real oil proposition or royalty that you wish to sell, or any defaulted municipal or special assessment bonds, bring your deal to me. Dyer-OJ, 1835 Champa, Denver, Colorado.

FOR SALE: Oil and Gas Leases and drilling propositions in shallow territory of Allen, Simpson, and Warren Counties, Kentucky, W. P. Harley, Bowling Green, Kentucky.

OFFERING 32000 10 yr. oil and gas fee leases at $1.25 per acre in Western Nebraska County where oil play is hot right now. Box 2181, Denver, Colo.

TENNESSEE ACREAGE

LEASES AVAILABLE FOR DEVELOPMENT—Several thousand acres with extremely interesting unrecorded geological structures and seepages. Adjacent to land leased by major oil companies. Write: E. A. Munyan, Box 572, Oak Ridge, Tenn.

WOULD offer 2,000 acres in oil and gas area, Montcalm County, Michigan, for a well or will contribute for an interest. Good geology; exchange references. Box D-521, The Oil and Gas Journal, Tulsa, Oklahoma.

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Suite 200, Grand Pacific Hotel
Bismarck, North Dakota

(Member National Oil Scouts and Landmen Association. References exchanged).

ROYALTIES

DEEDED ROYALTIES
San Juan Basin & Permian Basin. Write Harry S. Wright, Wright Bldg., Farmington, New Mexico.

ANADARKO BASIN ROYALTIES
Favorably located on trend in Roger Mills Co., Oklahoma, and Roberts Co., Texas, at attractive prices. E. E. Reynolds, Herring Hotel, Amarillo, Texas.

CHOICE NO. DAKOTA MINERALS
FOR SALE: 10,000 acres of perpetual minerals in North Dakota under major companies leases paying yearly rentals. $3.00 per acre. Can sell in 200 acre blocks. Navarro Royalties Company, P. O. Box 2626, Odessa, Texas.

FEE OWNER of several thousand acres mineral title near present production. Favorable Geology. Will sell ¼ royalty interest in total acreage for sufficient to develop and agree to return the funds from first production. Box D-519, The Oil and Gas Journal, Tulsa, Oklahoma.

MONTANA ROYALTIES
Millions of acres now leased by world's major companies, with huge drilling play in prospect. For booklet describing Montana geology and oil development, write Landowners Royalty Company, Box 1225, Great Falls, Montana.

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WANT about $5,000 for small refinery deal in Montana. Abnormal returns from investment. Details — Box 2181, Denver, Colo.

I AM READY with rigs, some casing, ten year paid up leases, proven and wildcat. Need financial partner for increasing action. Write experienced operator, geologist. Post Office Box 2323, San Antonio, Texas.

FOR SALE: Complete oil well cementing equipment and business. Owner retiring due to poor health. Box D-504, The Oil and Gas Journal, Tulsa, Oklahoma.

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LEGAL

Approximately 527 ACRES of allotted Indian lands located within the jurisdiction of the Uintah and Ouray Indian Reservation, in Townships 9 and 10 South, Range 25 East, are being advertised for lease, bids on which will be opened June 9, 1950, at 2:00 P.M., at the office of Forrest R. Stone, Superintendent, Uintah and Ouray Agency Fort Duchesne, Utah. Full particulars may be obtained from Superintendent Stone or from Mr. J. R. Schwabrow, U. S. Geological Survey, Federal Building, Casper, Wyoming.

EQUIPMENT MEN

(Continued from page 131)

Dowell Announces Major Field Staff Promotions

W. N. ESTEL

R. H. SMITH

Four major promotions in the Dowell Incorporated field staff have been announced by John G. Staudt, executive vice president and general manager.

W. N. (Woody) Estel, district manager for Dowell in Midland, Tex., has been promoted to sales-development manager and will transfer into the Tulsa general office June 1, Staudt said.

Ralph H. Smith, district manager in the Houston area, will be moved to Midland to head up Dowell's activities in the West Texas area. John S. (Jack) Talbot, district sales engineer in Houston, has been promoted to manager of that district, and E. F. Kelly, Houston development engineer, has been promoted to district engineer.

Estel, a graduate in business from University of Tulsa, joined Dowell in July 1940. Before coming with Dowell he was with Carter Oil Co. Smith, a petroleum engineering graduate from University of Texas, became Houston district manager in 1948.

Talbot, a graduate of University of Oklahoma, obtained his degree in petroleum engineering, and went to Alice, Tex., in 1947 as development engineer for Dowell. Kelly, new district engineer, became a member of the Dowell organization in 1946 at Houston. He previously was with Producers Transportation & Marketing Co.

Oil Industry Story to Be Told at Chicago Fair

The story of oil and its role in helping to provide standards of living in America will be presented by the oil industry at the Chicago Fair in 1950, Crosby Kelly, executive manager of the fair, has announced.

The petroleum service center in which visitors will be provided with comforts and conveniences will be located on the fair's main plaza. Sound films will relate the story of petroleum from discovery through production, transportation, refining, and marketing, as well as the general development of the industry over the last 91 years.

Among the participating oil companies will be Deep Rock Oil Corp., Ethyl Corp., Phillips Petroleum Co., Pure Oil Co., The Texas Co., Shell Oil Corp., Sinclair Oil & Gas Co., Socony-Vacuum Oil Co., Inc., and Standard Oil Co. (Ind.).

LEGAL

OIL DRILLING EQUIPMENT AT PUBLIC AUCTION

The undersigned, as liquidating receiver of the Carroll Drilling Corporation, a Kentucky corporation, will sell the following described property at public auction to the highest bidder at the front door of the Fayette County Court House in the City of Lexington, Kentucky, at twelve o'clock noon, central daylight saving time, on Saturday, June 17, 1950, on a credit of three months with the privilege of paying all cash, the purchasers being required to execute bonds with good surety thereon bearing interest from the date of sale, to-wit: 1. The following property located on the Collins lease in Madison County, Kentucky, said location being approximately five (5) miles west of Million, Kentucky, and ten (10) miles northwest of Richmond, Kentucky, and said location being also known as the California Company deep test well, to-wit: 1—36-L Bucyrus-Erie Drilling Machine, with 6 cylinder Buda gas, gasoline motor equipped for Butane fuel, complete with catheads, crane, 500 feet of Non-rotation casing line, 3 sheave casing block, 5 inch casing hook, Ram attachments, cat line, Derrick floor and sills, Derrick floor shed, with lots of extra sheet metal roofing, Guy lines, stakes and Turnbuckles, with all tools and fittings now located at the machine. 2. Located on the Burchell lease in Clinton County, Kentucky, near Seventy Six Post Office, approximately eight (8) miles northeast of Albany, Kentucky, to-wit: 1—36-L Bucyrus-Erie Drilling machine, with 6 cylinder gas, gasoline Waukesha sleave motor, complete with catheads, Crane, 500 feet of Non-rotating casing line, 3 sheave casing block, 5 inch casing hook, ram attachments, cat line, derrick floor and sills, derrick floor shed, Guy lines, stakes, and turnbuckles, with all tools and fittings now located at the machines. 3. Located on the Bush-White Heirs lease in Wolfe County, Kentucky, near Standing Rock, Kentucky, approximately fifteen (15) miles north of Beattyville, Kentucky, to-wit: 1—24-L Bucyrus-Erie Drilling machine, with 6 cylinder Buda gas, gasoline motor, complete with catheads, Crane, ¾ inch casing line, single sheave casing block, casing hook, Guy lines, stakes, turnbuckles, cat line, and derrick floor, with all tools and fittings now located at the machines. 4. Located on the Treadway Heirs lease in Lee County, Kentucky, on dividing ridge between Ross' creek and waters of Sturgeon Creek, near Arvel, Kentucky, which is fifteen (15) miles southwest of Beattyville, Kentucky, to-wit: 1—24-L Bucyrus-Erie Drilling machine, with 6 cylinder Buda gas, gasoline motor, complete with catheads, Crane, ¾ inch casing line, single sheave casing block, casing hook, Guy lines, stakes, turnbuckles, catline, and derrick floor, with all tools and fittings now located at the machine. 5. Located on the Tribue Heirs lease in Lee County, Kentucky, on dividing ridge between Ross' Creek and waters of Sturgeon Creek, near Arvel, Kentucky, which is fifteen (15) miles southwest of Beattyville, Kentucky, to-wit: 1—5½" Keystone "Joplin Special" Drilling machine with calf wheels, and plenty of tools to drill with. 6. Located on the Murley lease in Cumberland County, Kentucky, seven (7) miles southwest of Burksville, Kentucky, in what is known as Walsh's Bottom; also known as the California Company deep test well in Cumberland County, Kentucky, to-wit: 6,000 feet of new ⅞ inch American 6x19 Drilling cable. 4,000 feet of slightly used 9/16 inch sand line. 1—5¼" x 26" drilling stem, with 4¼" box, and 3¾" pin. 1—set 6½" drilling jars with 4¼" box, and 4¼" pin. 1—9" bailer. 1—7" bailer. 7. 1 Army 6x6 G. I. truck (Studebaker) with winch. 8. 1—1947 Ford truck with winch and Leland oil field bed. 9. 1 Army trailer, on the Tribue Heirs lease, in Lee County, Kentucky. 10. 1—1950 Ford Tudor sedan. The property to be sold may be inspected at the several locations above mentioned at any time prior to the sale. R. J. COLBERT, Liquidating Receiver of Carroll Drilling Corporation.

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CALENDAR

June

Southern Gas Association, transmission section meeting on compressor station operating problems, Monroe, La., June 7-8.

National Society of Professional Engineers, annual meeting, Hotel Statler, Boston, June 8-10.

National Oil Scouts and Landmen's Association, Skirvin Tower Hotel, Oklahoma City, June 8-10.

American Society of Mechanical Engineers, oil and gas power division, Lord Baltimore Hotel, Baltimore, June 12-16.

Pennsylvania Grade Crude Oil Association, Hotel William Penn, Pittsburgh, Pa. June 15-16.

American Society of Mechanical Engineers, Hotel Statler, St. Louis, June 19-23.

Canadian Gas Association, annual convention, Manoir Richelieu Hotel, Murray Bay, Quebec, June 19-24.

Kentucky Oil and Gas Association, annual meeting, Lexington, Ky., June 22-23.

Petroleum Equipment Suppliers Association, annual membership meeting, Greenbrier Hotel, White Sulphur Springs, W. Va., June 25-27.

American Society for Testing Materials annual meeting Chalfonte-Haddon Hall, Atlantic City, N. J., June 26-30.

American Petroleum Institute, midyear division of production and standardization conference, Brown Palace Hotel, Denver June 26-30.

July

Institute of Petroleum, oil shale and cannel coal conference, Glasgow, Scotland, July 3-7.

Pacific Coast Gas Association, annual convention, Seattle, Wash., July 31-August 3.

August

Interstate Oil Compact Commission, summer meeting, French Lick, Ind., August 3-5.

September

National Chemical Exposition, Chicago Coliseum, Chicago, September 5-9.

American Institute of Chemical Engineers, regional meeting, Minneapolis, September 10-13.

American Society of Mechanical Engineers and Instrument Society of America Municipal Auditorium, Buffalo, N. Y., September 11-15.

National Petroleum Association, Hotel Traymore, Atlantic City, N. J., September 13-15.

Instrument Society of America, annual instrument conference and exhibit, Memorial Auditorium, Buffalo, N. Y., September 18-22.

American Society of Mechanical Engineers, petroleum mechanical engineering conference, Roosevelt Hotel, New Orleans, September 24-28.

American Society of Mechanical Engineers, petroleum mechanical engineering conference, Roosevelt Hotel, New Orleans, September 25-27.

October

American Gas Association, annual convention, Atlantic City, N. J., October 2-6.

Mid-Continent Oil and Gas Association, Texas division, Dallas, October 4-5.

Petroleum Branch, American Institute of Mining and Metallurgical Engineers, Mid-Continent meeting, Roosevelt Hotel, New Orleans, October 4-6.

American Association of Oilwell Drilling Contractors, annual meeting Mayo Hotel, Tulsa, October 9-10.

Petroleum Branch, American Institute of Mining and Metallurgical Engineers, West Coast meeting, Elks Club, Los Angeles, October 12-13.

November

Mid-Continent Oil and Gas Association, Louisiana-Arkansas Division, annual meeting, Roosevelt Hotel, New Orleans, November 2-3.

American Petroleum Institute, annual meeting, Biltmore and Ambassador Hotels, Los Angeles, November 13-16.

American Society of Mechanical Engineers, Hotel Statler, New York, November 26-December 1.

December

American Institute of Chemical Engineers, annual meeting, Columbus, Ohio, December 3-6.

NOMADS

Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.

Dallas-Fort Worth Nomads, first Monday of each month, Greater Dallas Club.

Houston Nomads, second Monday of each month. Ye Olde College Inn, Houston.

Los Angeles Nomads, second Wednesday of each month, Jonathan Club.

New York Nomads: June 27, golf party, Ardsley (N. Y.) Country Club.

LEGAL

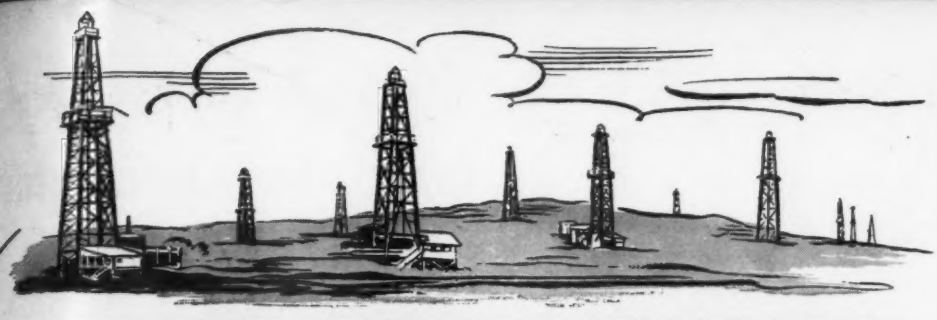
U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that the SE¼SE¼ sec. 22, T. 19 S., R. 33 E., N.M.P.M., New Mexico, 40 acres, within the known geologic structure of the Tonto field, will be offered for oil and gas leasing, through competitive bidding, at 2 p.m., E.S.T. June 14, 1950, when bids will be opened. The details of the lease offering and how and where to file bids may be obtained by addressing an inquiry to the Manager of the Land and Survey Office, Santa Fe, New Mexico, or to this office. Marion Clawson, Director.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that the SE¼ sec. 28, T. 28 S., R. 28 E., M.D.M., California, 160 acres, within the known geologic structure of the Kern River field, will be offered for oil and gas leasing through competitive bidding at 2 p.m., E.S.T. June 14, 1950, when bids will be opened. The details of the lease offering and how and where to file bids may be obtained by addressing an inquiry to the Manager of the Land Office at Sacramento, California, or to this office. Marion Clawson, Director.

LEGAL

UNITED STATES, DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that 9 units of land containing in all 1560.39 acres in Ts. 6 and 7 S., Rs. 21 and 22 E., P.M., Montana, within the known geologic structure of the Dry Creek field, Montana, will be offered for oil and gas leasing through competitive bidding at 2 p.m., E.S.T. on June 14, 1950, when bids will be opened. Details of the lease offering, how and where to file bids and a description of the lands may be obtained by addressing an inquiry to the Manager of the Land and Survey Office, at Billings, Montana, or to this office. Marion Clawson, Director.



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